No. 153

A COMPARISON OF CAPITAL INVESTMENT IN THE US AND THE USSR 1950–59

February 1961

CENTRAL INTELLIGENCE AGENCY

A COMPARISON OF CAPITAL INVESTMENT IN THE US AND THE USSR 1950–59

CIA/RR ER 61–7

CENTRAL INTELLIGENCE AGENCY
Office of Research and Reports

Declassified and Approved For Release 2013/08/19 : CIA-RDP79R01141A001900070001-2

FOREWORD

In this report, simplified statements are made representing judgments drawn from the data available. The data, however, are subject to imperfections and problems of data classification. In addition, there are serious methodological problems for international comparisons of the scale of investment programs. Problems of definition, comparative valuation, and bias in the data are considered explicitly in the Statement of Methodology, Appendix A.

CONTENTS

Appendixes

Tables

Charts

A COMPARISON OF CAPITAL INVESTMENT IN THE US AND THE USSR 1950-59

Summary and Conclusions

In the complex task of analyzing the growth of the Soviet economy, the basis of that growth, and the significance of growing Soviet productive capacity to the present and future policies of the US, one of the subjects that must be examined is the structure and extent of annual capital investment in the USSR -- the construction of buildings and structures and the acquisition of producer durable equipment.* To sharpen perspective, it is useful to make some comparisons with capital investment in the US. From these comparisons the following conclusions may be drawn:

1. By 1959 the total annual volume of capital investment in the USSR had not yet equaled the peak levels recently attained in the US (in 1956 and 1959),** but the difference had been reduced at a rate that presages parity of the total investment effort in the early 1960's.

2. By 1958, Soviet industrial investment achieved the US peak level set in 1957, and it is currently greatly in excess of annual industrial investment in the US. Unless the Soviet investment is grossly inefficient -- and of this likelihood there is no evidence -- the annual expansion of Soviet industrial capacity is as great as that in the US and will soon be much greater.

3. By 1959 the total annual output of producer durable equipment in the USSR probably had achieved parity with the US output, although the valuation problem makes a precise judgment difficult. By

---

* For the basic definitions used herein, see Appendix A. Throughout this report, references to "capital investment" or to "investment" will be made with the understanding that annual "investment in fixed capital" is intended rather than annual investment in working capital (stocks and inventories).

** In this report the proportionate relationships between Soviet and US investment programs, unless otherwise indicated, have reference to the geometric means of the relative shares as determined in ruble valuation and in dollar valuation, respectively. For the derivation of sectoral ruble-dollar ratios, see Appendix C.

1958, Soviet acquisition of equipment solely for industry was equivalent in value to the US peak realized in 1957.

4. The annual volume of construction in the USSR, while expanding significantly after 1955, has not yet achieved parity with the volume in the US and may not for some time. In 1959 it was about 70 percent of the US volume of construction. Soviet policy deliberately attempts to constrain the over-all allocation of resources to construction by such means as severely limiting the construction of shopping centers and service facilities as well as the size and styling of housing units.

5. The structure and size of Soviet capital investment are determined by the regime in order to support its growth objectives and specific production targets. In the US, where consumer demand carries more weight, some 50 to 60 percent of total investment goes into housing, services, and social-cultural investment, whereas in the USSR only one-third of investment is so allocated.

6. The investment response of each country to the Korean War was markedly different. The US shifted investment resources into expansion of productive activities, especially into industry, and out of nonproductive activities, particularly housing. Production of industrial equipment was increased. The USSR apparently was under more pressure to divert resources to military use and suffered some cutbacks in production of industrial equipment.

7. In the US the business cycle has worked to the advantage of the USSR. For total annual investment, of the 46 percentage points that the USSR gained while increasing its relative size of investment from 33 percent of that of the US in 1950 to 79 percent in 1959, 20 points were gained during the recession years of 1954 and 1958. For industrial investment the costs of recession are even more obvious. Of the 88 percentage points gained in increasing the relative size from 67 percent in 1950 to 155 percent in 1959, 80 points were gained during 1954, 1958, and 1959. It is of further significance that even the recovery years in the US since 1950 usually have shown lower rates of growth than realized for the same years in the USSR. Hence the ground lost in recessions is not recovered.

8. In transport and communications the USSR has succeeded in reducing the sector share of total investment while the US has increased it. This difference in trend can be attributed largely to the increasing allocation of resources in the US to highway construction, in which is found more than one-half of investment in the sector. This report is not the place to question the economic rationale of US highway investment, but it should be noted that such investment is strongly

governed by the needs of private automobile traffic and, therefore, is strongly influenced by consumer preferences rather than by the requirements of productive transport.

9. Soviet capital investment in agriculture caught up with the level of US investment in agriculture in 1954, expanded rapidly in 1955, and then subsequently slowed its rate of growth. US capital investment in this sector has tended to decline throughout the decade.

10. The vaunted Soviet housing program has not the relative resource commitment behind it that one might initially imagine. The volume of housing constructed in 1959 was little more than one-half of that in the US. Whereas the US in 1950-59 put 36 to 45 percent of its construction effort into housing, the USSR in 1958 and 1959 devoted only about 33 percent of its smaller construction effort to this purpose.

11. Past industrial expansions (1951-53, 1955-57) have left the US with an industrial capacity that is not now fully utilized. This fact is basic to any consideration of future US investment policies. For what ends is new industrial growth desired? On the other hand, Soviet objectives will require a continuing expansion of investment in industry and in supporting activities.

12. Examination of the investment programs of the two countries discloses differences in structure, emphasis, and rates of growth that derive from differences in objectives; in the institutions of management, planning, and finance; in the price systems; and in the entire environment in which capital decisions are made. In the US, change in the demand for investment is derived from the interaction of changes in consumption, private and public, and changes in the supply of investment funds. In the USSR the steady growth of investment is dictated by the leadership's preoccupation with economic growth and is made possible by the entire mechanism of state control over the economy.

I. Introduction

The recent growth rates of gross national product (GNP) in the US and the USSR have been estimated at about 3 percent and 7 percent per year, respectively. 1/* Given the relative size of the two economies, this differential in growth would imply near-parity of the dollar valuation of GNP increments in 1960. 2/ Much of the explanation of the relative GNP rates of growth is disclosed by analysis of comparative investment activities. The USSR allocates a larger share of its smaller investment to basic economic activities (see the chart, Figure 1**). By 1959 the total annual capital investment in the USSR was about 80 percent of that of the US, and Soviet "productive" capital investment -- that is, total investment in industry, agriculture, and transport and communications -- was clearly in excess of such investment in the US*** (see the charts, Figures 2 and 3**).

The differences in the rate of growth of GNP appear consistent with what is known about the size and structure of the investment programs and the relative size of the two economies. Unless the capital efficiency of the Soviet economy were sharply lower than that of the US, it is likely that parity of annual production investments (annual additions to productive capital stock) would imply near-parity of absolute increments of GNP. The present Soviet lag in the level of technology being introduced may well be offset in large part by nonrecurring measures now being undertaken to improve the efficiency of existing plant and equipment. More intensive utilization of equipment, improved supply flow (especially of raw materials and energy), and greater specialization of output are among measures being undertaken to improve the incremental measure of output to capital invested. Structural shifts in 1959 and 1960 within Soviet investment also tend to raise the incremental output/capital ratio, for the share of investment in machine-building and in consumer-oriented industries has risen whereas the share in the capital-intensive materials and energy sector has fallen somewhat.

---

* For serially numbered source references, see Appendix D.

** Following p. 6.

*** Because this report relies on 1955 ruble-dollar ratios, all dollar and ruble valuations relate to that year unless otherwise indicated. The Soviet valuations when given in 1955 planning rubles are in prices established on 1 July 1955. The valuation of construction in 1955 rubles does reflect new wage rates of 1956 and a new regional pricing system for materials established in the same year.

It is important that there be study of comparative investment programs with the goal of determining present relative productivity of capital investment and future trends in relative productivity. Such study would benefit any analysis of relative trends of growth in the US and the USSR.

The present report is only a beginning in the field of comparative investment and sets forth data on structural differences while giving some indication of relative size. Obviously, comparability in the internal pricing of capital in the two countries does not exist, especially in the case of producer durable equipment, where the results of a comparison in ruble values differ widely from the results of a comparison in dollar values. This situation is a warning of a significant difference in price structure and thus in the whole environment for investment decisions.

The price-ratio differences reflect not only differences in relative preferences and in relative scarcities of capital goods but also basic differences in the mechanism for pricing capital goods. A whole conceptual problem exists -- what relation does the recorded valuation of the capital structure of either country bear to the stream of net income that it generates?

The pricing of the capital investment programs of both countries in both rubles and dollars is a technique used herein to establish limits for a comparison of size relatives. It is not a conceptually rigorous approach to the problem of international comparison of capital investment, yet it does provide within the limits established a measure of relative effort.

II. Contrasting Investment Programs of the US and of the USSR

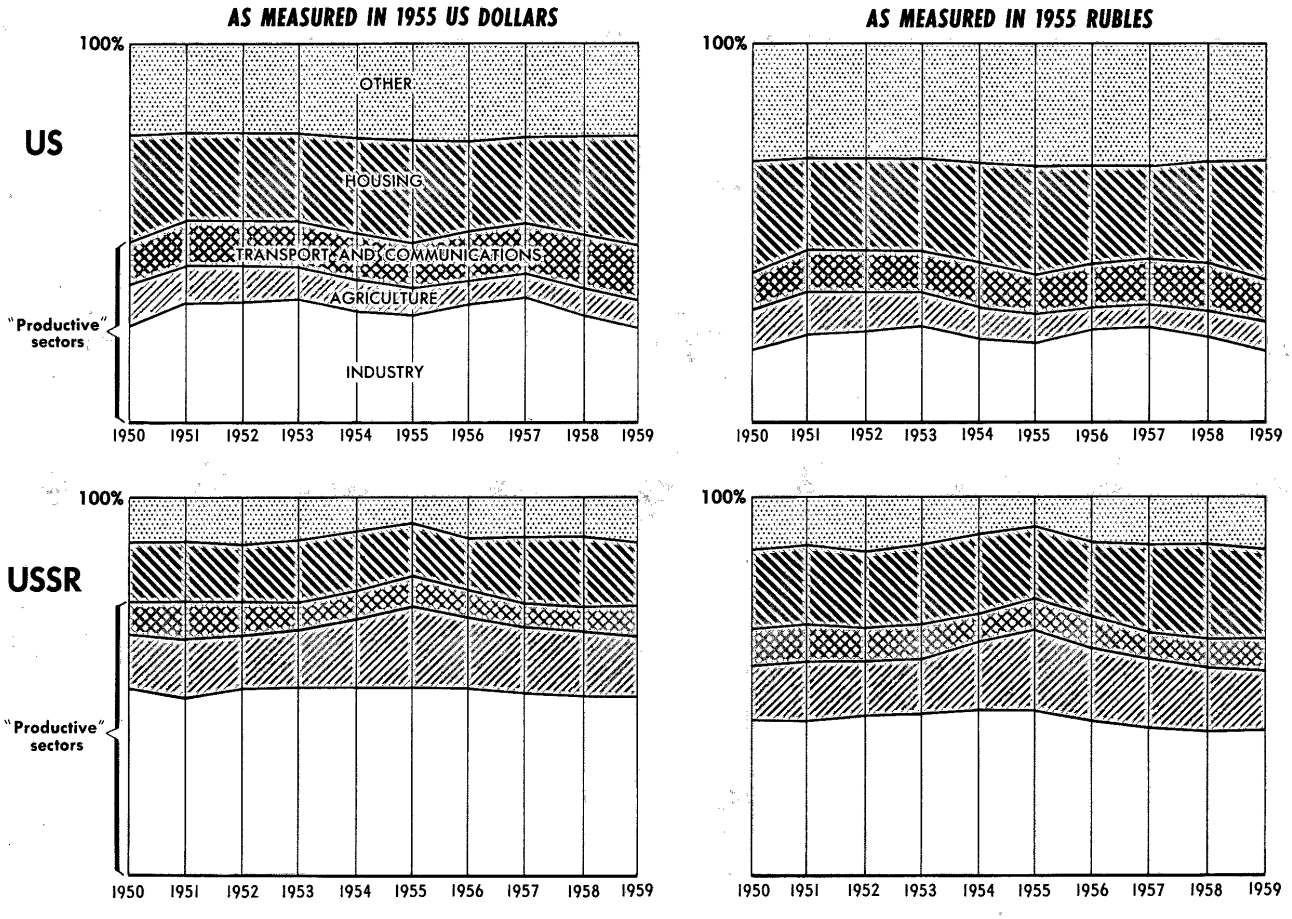
During 1950-59 the respective investment programs of the US and of the USSR have been oriented toward differing problems and objectives. The USSR, having completed its postwar economic recovery, was concerned with a buildup of the domestic economy in support of its long-term objectives of growth and power. To this end, especially after the Korean War and after the death of Stalin, there was an important de-emphasis of conventional military power (although not of the new military technology) and a heightened emphasis on long-term economic expansion and the requisite investment programs, including measures to increase agricultural output and productivity and to improve the availability of housing.

The Korean War spurred the US Government to assist, largely through tax concessions, the expansion of industrial capacity for support of possible military programs, and the years 1950 through 1953 were

Figure 1

US AND USSR

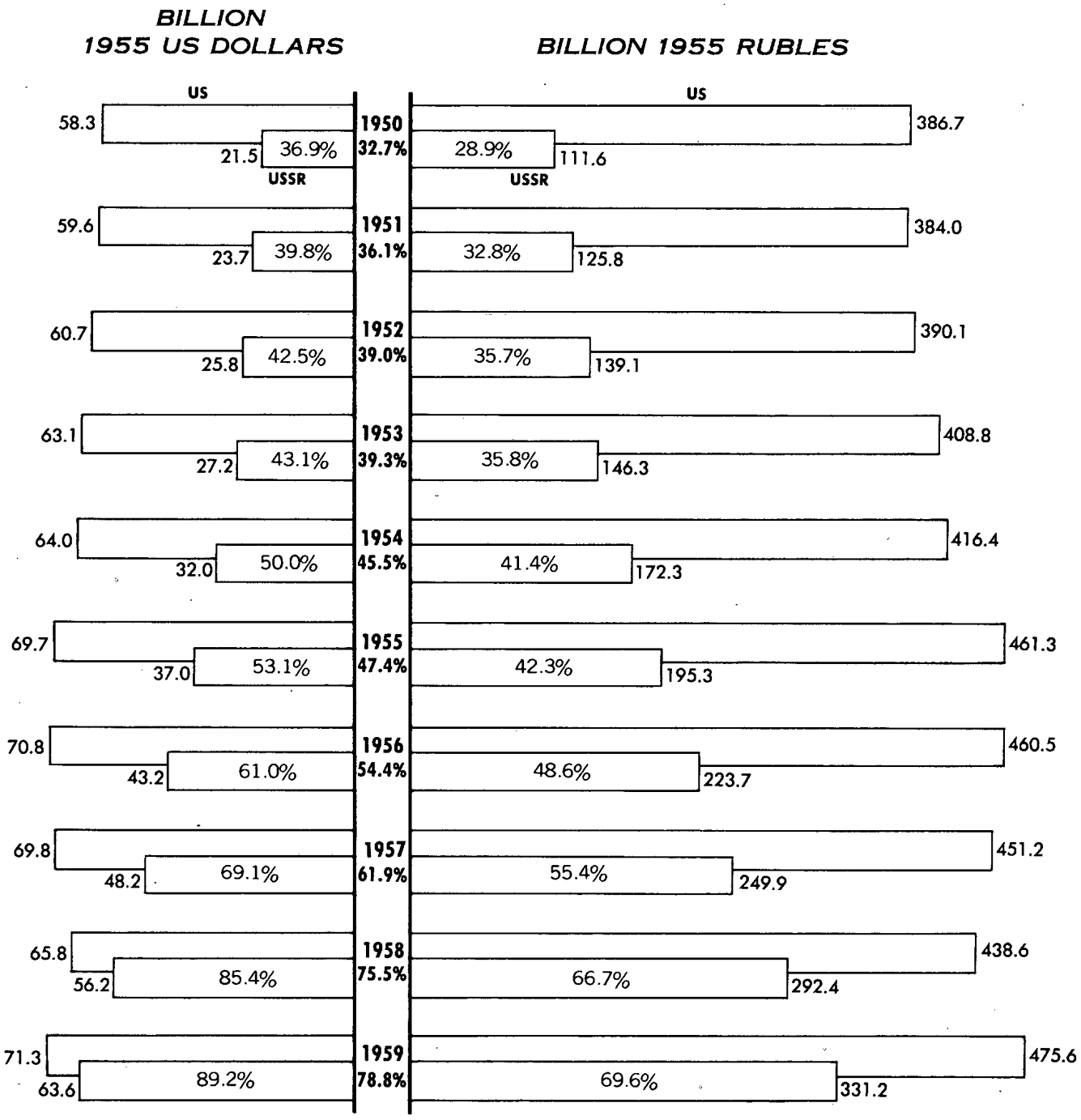
SECTORAL SHARES OF TOTAL CAPITAL INVESTMENT, 1950-59



29477 1-61

Figure 2

US AND USSR
COMPARISON OF TOTAL CAPITAL INVESTMENT
1950-59

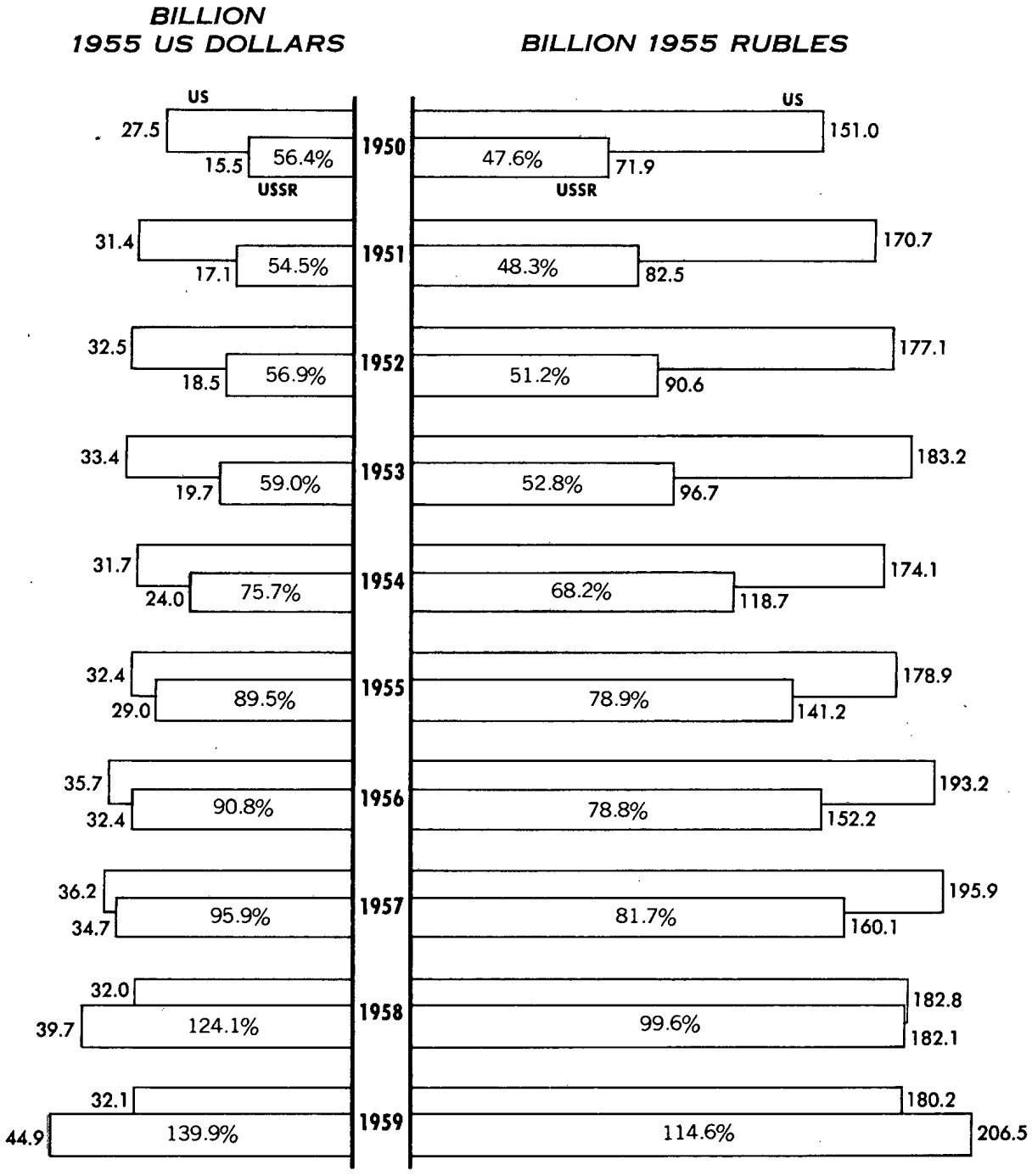


Red figures represent geometric means.

29478 1-61

Figure 3

US AND USSR
COMPARISON OF PRODUCTIVE CAPITAL INVESTMENT *
1950-59



* Productive capital investment arbitrarily defined as consisting of investment in industry, agriculture, transport and communication.

29479 1-61

characterized by industrial buildup. Following a recession in 1954, there was another industrial expansion boom from 1955 through 1957. Then followed another investment recession during 1958 and 1959, with hesitant recovery more pronounced in 1960. The period since 1957 has been marked by the existence of apparent overcapacity in many industries relative to demand foreseeable for the near future.

During the 10 years under consideration, there have been significant changes in investment emphasis in each country. In the USSR the relative share of investment effort going into industry reached a peak following the Korean War, during 1953-55, and then fell off (see the chart, Figure 1*). The share going to agriculture rose rapidly during 1954-55, contemporaneously with the new lands programs, and then fell off somewhat. The share of transport and communications declined steadily though slowly. Simultaneous expansion of industrial and agricultural investment made 1955 a peak year for productive investment as a proportion of total investment. Later, a housing boom became pronounced in 1957 and 1958. "Other" investment slacked off during 1954 and 1955, presumably in part because of reduced military construction, then rose rapidly in 1956, and remained high in subsequent years in consequence of increased construction of schools, trade facilities, service facilities, and other investment programs, including military, in support of Khrushchev's new look.

In the US, 1950-59 witnessed a relatively steady decline in the share of agricultural investment and a relatively steady increase in the share of investment in transport and communications (see the chart, Figure 1*). "Other" investment (schools, churches, trade, services) maintained a relatively constant share. Investment in housing and in industry assumed complementary roles, with housing tending to rise and industry to fall as a share of the total during years of industrial recession. This situation imples a certain degree of substitution of construction resources between housing and industry. As previously noted, industrial recessions affected the capital investment programs in 1954 and in 1958-59. Housing peaks occurred in 1955, after a buildup in 1954, and in 1959.

III. Equipment Component of Investment

By 1959, annual Soviet acquisition of producer durable equipment had increased to nearly threefold the 1950 level, whereas in the US, still suffering from the effects of a recession, investment in equipment was at the level of 1950 and amounted to about $22 billion, or 15 percent below the 1956 peak (see the chart, Figure 4**). The

* Following p. 6, above.
** Following p. 8.

rapid growth in the USSR brought its acquisition approximately to parity with the US in 1959 (measured in dollars, 31 percent more than the US; measured in rubles, 32 percent less than the US). Acquisition of equipment for industry surpassed the US in 1958 and in 1959, measured either in dollars or in rubles, and by 1959 had surpassed the US peak set in 1957 (see the chart, Figure 5*).

In both countries, equipment as a share of total investment fluctuates as a function of the equipment intensity of investment within sectors receiving investment priority (see the chart, Figure 6,* and Tables 1, 2, 9, and 10**). For example, equipment as a share of total investment tends to decline in years of housing booms. Among sectors, industry has the largest annual variations of the share of equipment (see the chart, Figure 7*). In the US the well-known cyclical effects of the deferral of equipment replacement occur during recessions. In the USSR the share of equipment in industrial investment fell during the Korean War, when resources were diverted, and picked up in pronounced fashion after 1955, when a new program of mechanization, automation, and modernization for industry was initiated. Currently, both countries have roughly similar shares of equipment outlay within total industrial investment.

IV. Construction Component of Investment

During 1950-59 the total volume of construction increased significantly in both the US and the USSR, but at a faster rate in the USSR, which had an effort about 32 percent of that of the US in 1950 and about 70 percent in 1959.*** Construction plays a somewhat greater role in the US pattern of investment, whereby more resources go into housing, schools, churches, and services. On the other hand, the USSR tends toward a policy of emphasizing so-called productive investment, which is characterized by an important role for equipment, and further increasing the share of equipment in an effort to maintain a high rate of growth for labor productivity.

Recent Soviet efforts to strengthen the construction industry, which showed signs of weakness in 1955, apparently have succeeded in

---

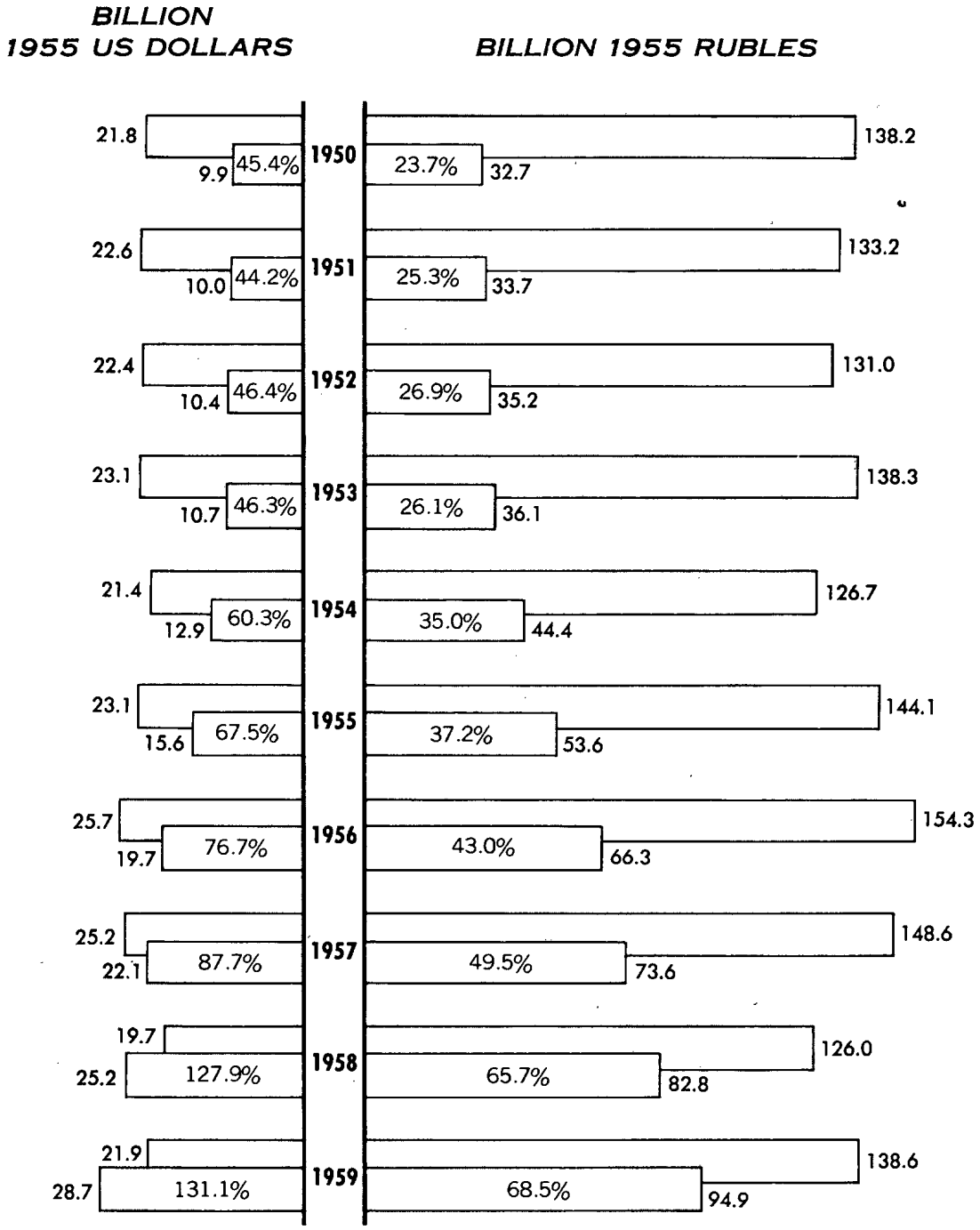
* Following p. 8.

** Appendix B, pp. 27, 29, 39, and 41, respectively, below.

*** In 1958 the USSR achieved 67 percent of the US volume -- relatively close to the 72 percent found by a recent Soviet study 3/ -- tending to indicate that the US and the USSR are using relatively similar ruble-dollar ratios for construction. For data on the relative size of the construction effort, see the chart, Figure 8, following p. 8.

Figure 4

US AND USSR
RELATIVE SIZE OF TOTAL PRODUCER DURABLE EQUIPMENT ACQUISITIONS
1950-59



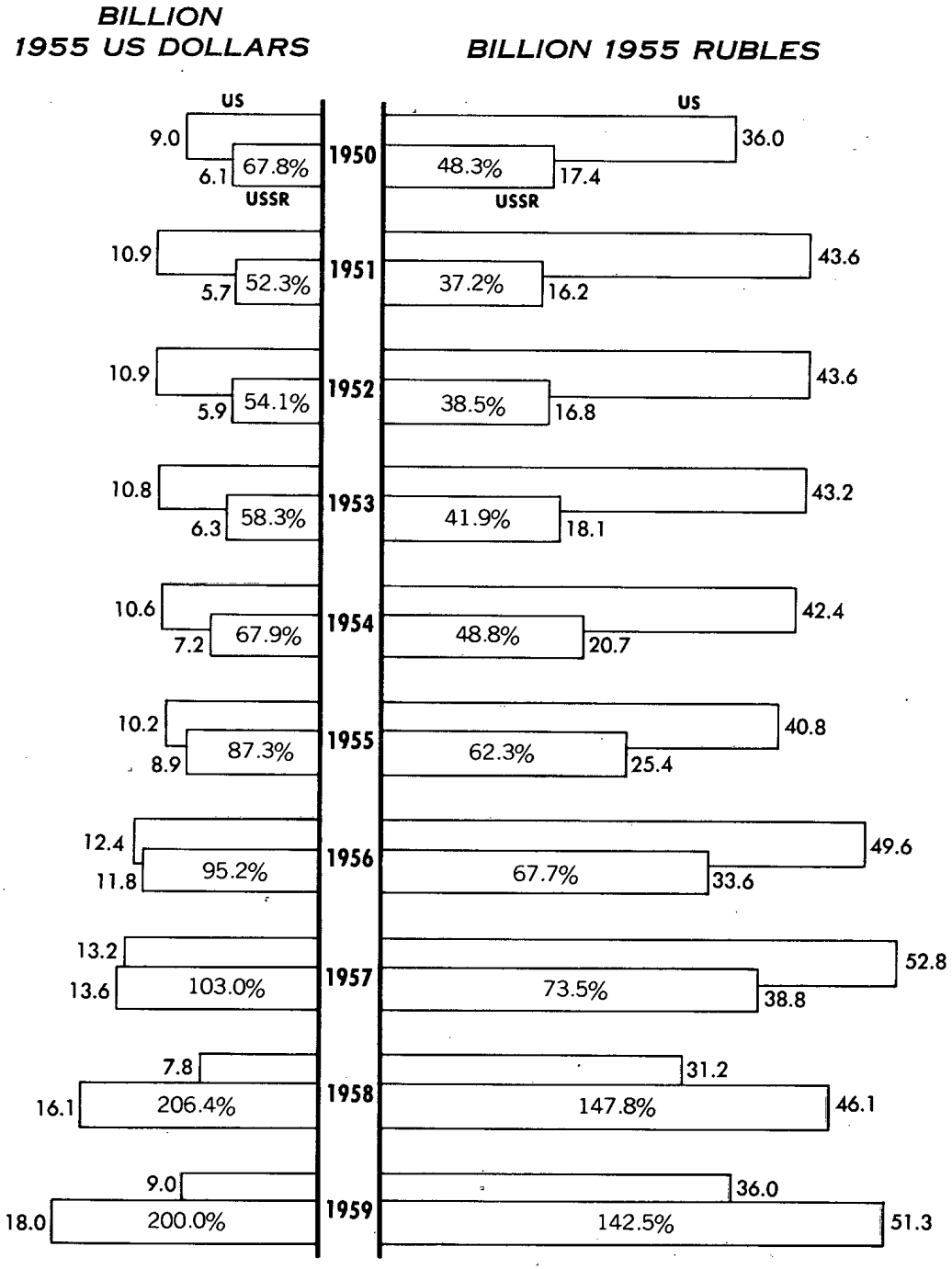
29480 1-61

Figure 5

US AND USSR

RELATIVE SIZE OF THE TOTAL ACQUISITION OF EQUIPMENT FOR INDUSTRY

1950-59

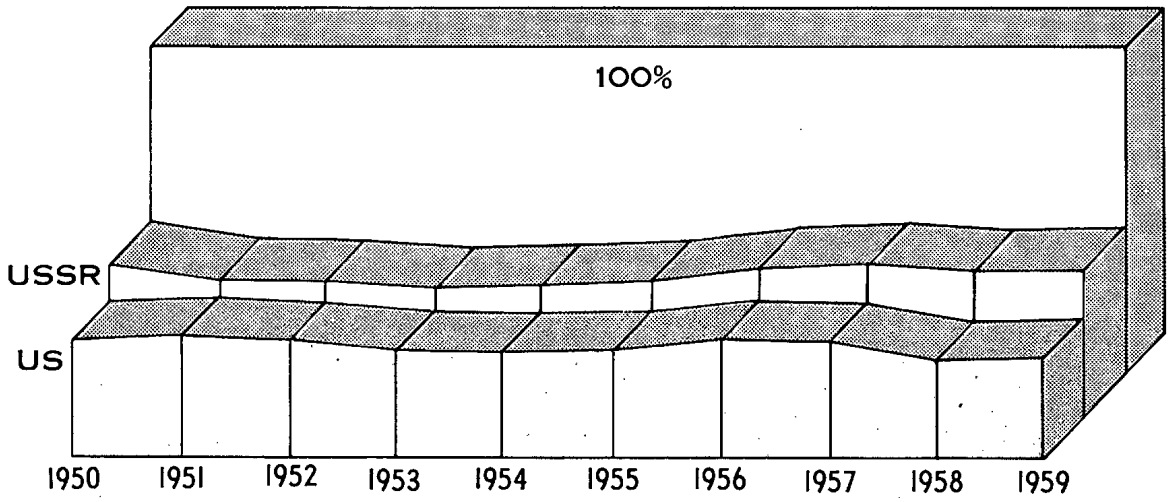


29485 1-61

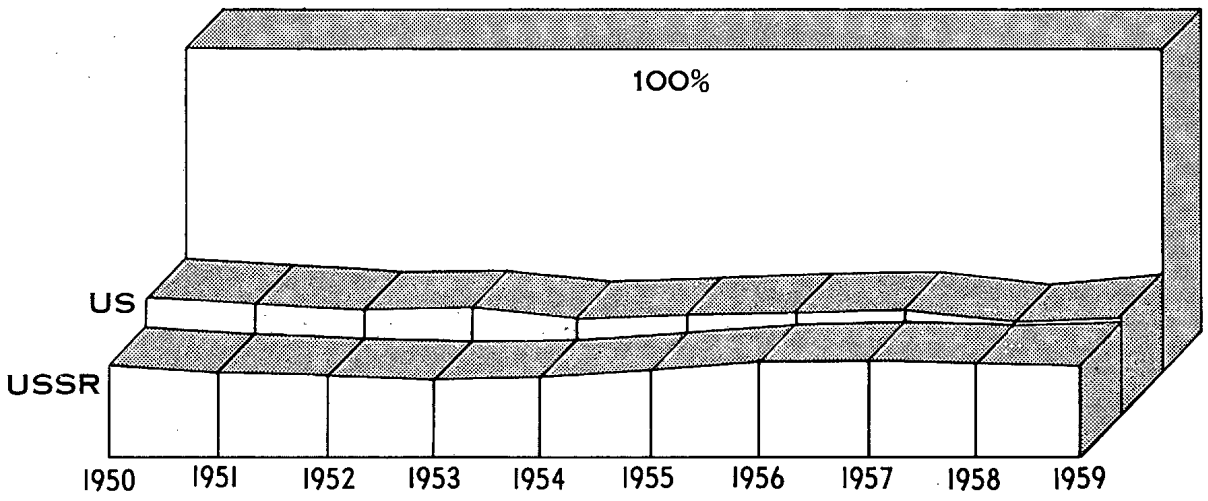
Figure 6

US AND USSR
EQUIPMENT AS A SHARE OF TOTAL INVESTMENT
1950-59

PERCENT OF VALUE IN 1955 US DOLLARS



PERCENT OF VALUE IN 1955 RUBLES

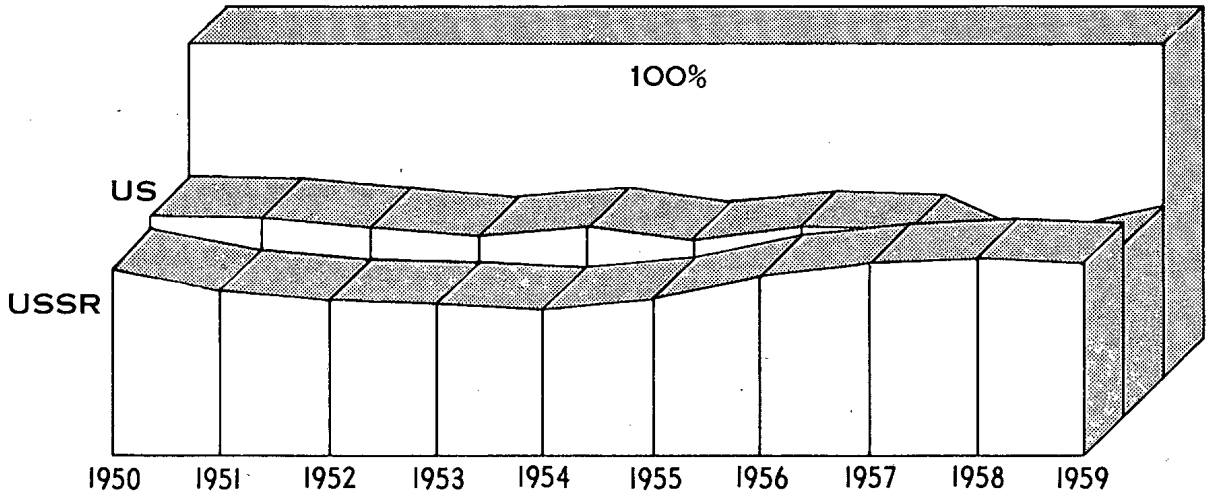


29481 1-61

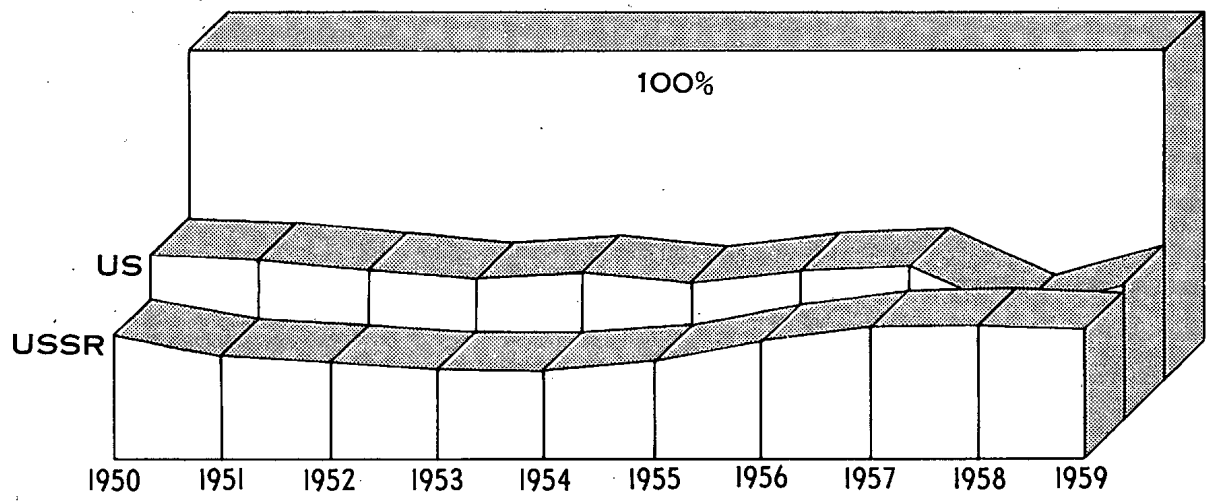
Figure 7

US AND USSR
EQUIPMENT AS A PERCENT OF TOTAL INDUSTRIAL INVESTMENT
1950-59

PERCENT OF VALUE IN 1955 US DOLLARS



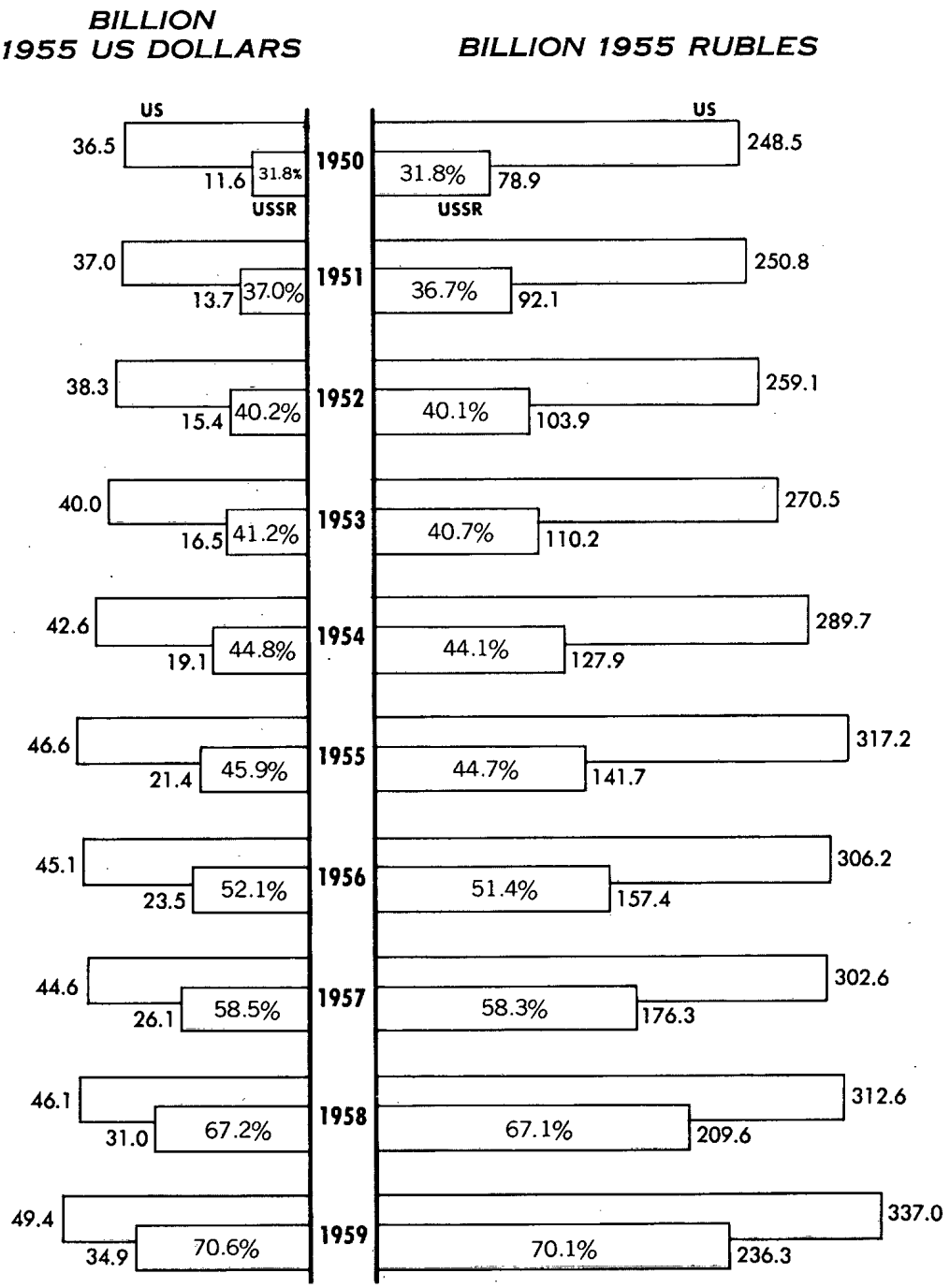
PERCENT OF VALUE IN 1955 RUBLES



29486 1-61

Figure 8

US AND USSR
RELATIVE SIZE OF THE CONSTRUCTION EFFORT
1950-59



29482 1-61

large measure, as far as can be judged from data on plan fulfillment and profitability of operation. Performance in the construction of housing, which was not strong in 1955, has improved progressively thereafter. Even though there has been a boom in housing construction since 1955, housing does not draw as large a share of the total construction effort as in the US, and under present programs it is not expected to increase its share from the levels reached in 1958 and 1959.

V. Investment by Sectors

In its drive to industrialize and to grow rapidly in economic strength, the USSR allocates investment in a markedly different pattern from that of the US. It is revealing to investigate this pattern in terms of sectors -- industry, agriculture, transport and communications, housing, and the remainder of investment ("Other").

As a rough generalization, investment in the US follows the pattern of 1-1-1-1, representing approximately equivalent weights of investment in (1) industry; (2) agriculture, transport, and communications combined; (3) housing; and (4) "Other," respectively. In dollar value, investment in the USSR follows a pattern of 2-1-1, for (1) industry; (2) agriculture, transport, and communications combined; and (3) housing and "Other" combined, respectively (see the chart, Figure 1*).

A. Industry

The USSR allocates a larger share of its total investment to industry than does the US. As a result of this emphasis and the growth of its effort, the USSR achieved parity of annual industrial investment in 1958 and has subsequently outstripped the US (see the chart, Figure 9**). Unless US industrial investment shows a significant increase by the mid-1960's, the Soviet industrial investment program will be double that of the US.

During 1950-59, of the total annual investment effort in the US, industrial investment has comprised 25 to 33 percent measured in dollars, whereas in the USSR it has been 38 to 44 percent measured in rubles and 47 to 50 percent measured in dollars (see the chart, Figure 1*). During the period, Soviet industrial investment has trebled while the US has alternated between booms and recessions with little net gain.

---

* Following p. 6, above.
** Following p. 10.

B. Agriculture

In the US, faced with a problem of agricultural overproduction, annual investment in agriculture has tended to decline in size (see the chart, Figure 10*). On the other hand, the USSR began a period of agricultural expansion in 1954 that required a buildup of investment effort. In terms of the share of total investment effort, the Soviet agricultural programs reached their peak in 1955, but they continue to absorb annual absolute increases in the size of investment. By 1955, annual agricultural investment in the USSR had overtaken the US and subsequently has increased its size relative to that of the US. In 1959 it was roughly double the US effort. This infusion of capital into agriculture is directed toward both the expansion of agricultural output and the release of manpower for nonagricultural employment.

C. Transport and Communications

At first glance it would seem that Soviet investment in transport and communications is seriously laggard with reference to that of the US (see the chart, Figure 11*). Close examination of the data, however, would require some modification of the impression. In 1959, of $9.7 billion that the US invested in the sector, $5.0 billion were for highways.** This statement is not to question the economic rationale of US highway construction, but it should be noted that it is strongly governed by the needs of private automobile traffic and, therefore, is strongly influenced by consumer preferences rather than by the requirements of productive transport. As a generous estimate, the USSR spent somewhat less than $1 billion for highways in 1959. Soviet investment in transport and communications in 1959, exclusive of highway construction, was about $3.9 billion compared with about $4.7 billion for the US.

As indicated by the chart, Figure 11,* US capital investment in the transport and communications sector has increased in relative emphasis during the last 10 years, but, as noted above, much of this growth must be attributed to highway construction. On the other hand, Soviet investment in the sector has witnessed a decline in its share of total investment in spite of a major equipment program underway for railroad, air, and maritime transport.

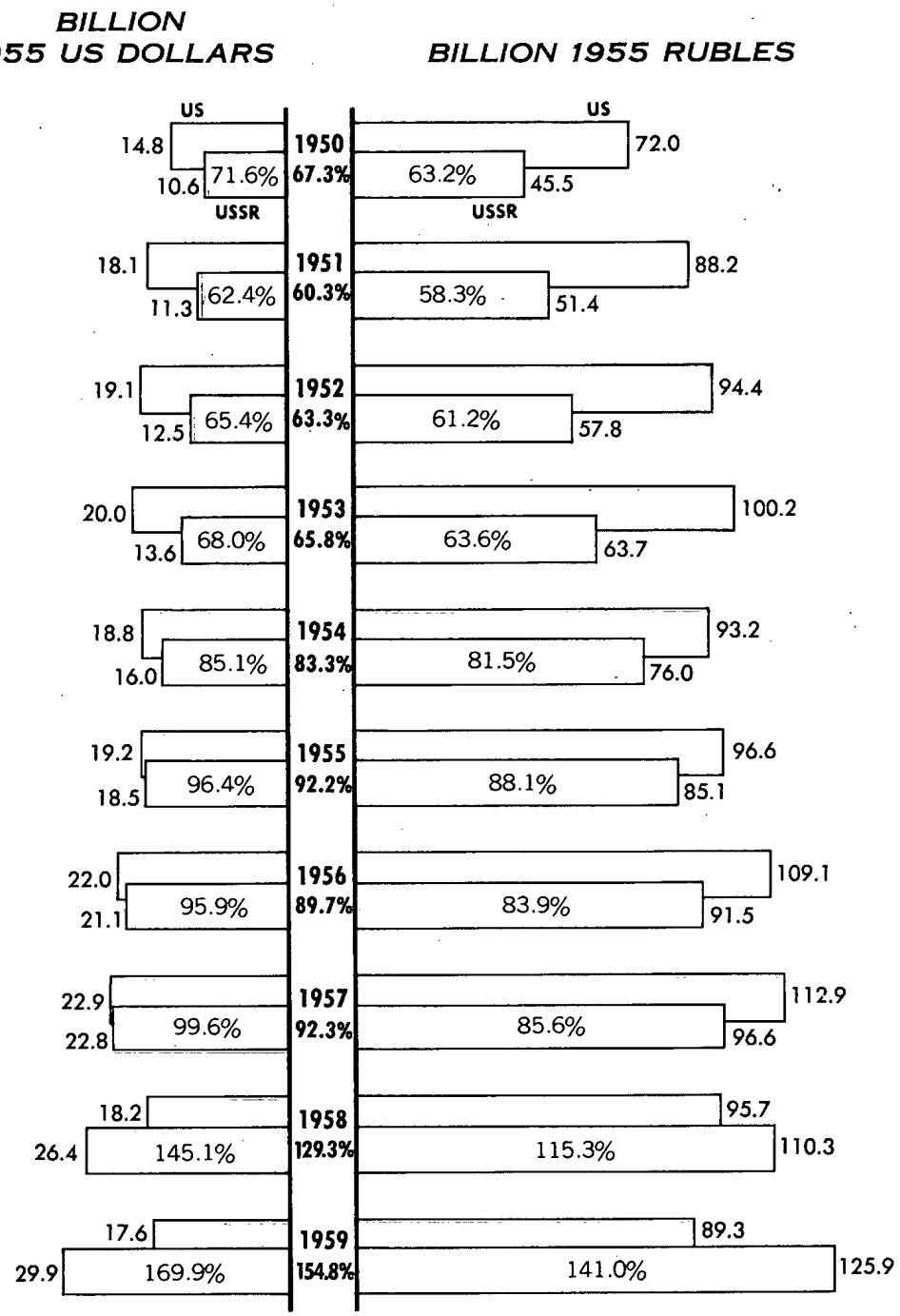
---

* Following p. 10.

** See Figure 11 and source 4/. The figure for highways has been deflated by the construction deflator used in Table 15, Appendix B, p. 47, below.

Figure 9

US AND USSR
COMPARISON OF TOTAL INDUSTRIAL INVESTMENT
1950-59



Red figures represent geometric means.

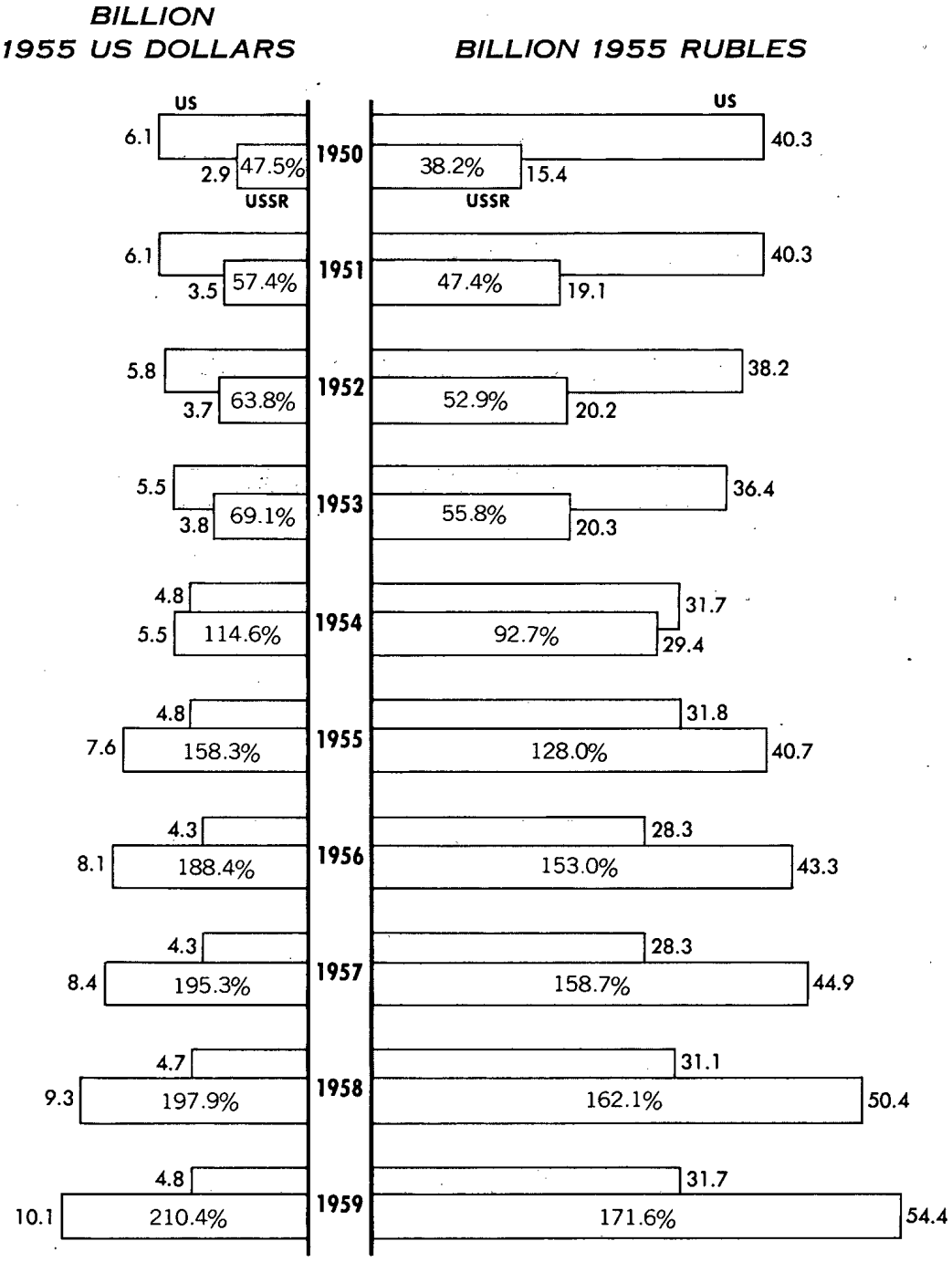
29484 1-61

Figure 10

US AND USSR

RELATIVE SIZE OF CAPITAL INVESTMENT IN AGRICULTURE

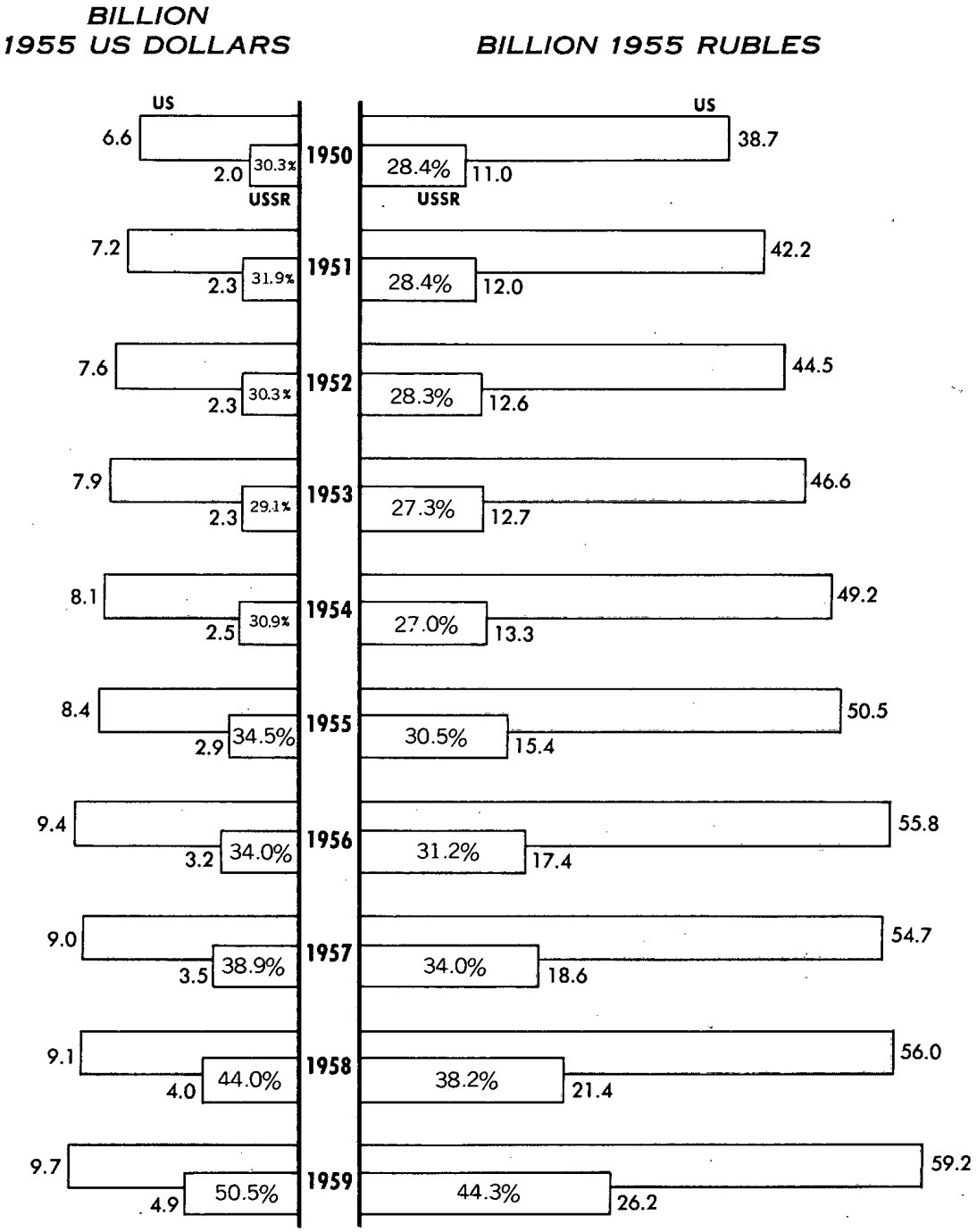
1950-59



29487 1-61

Figure 11

US AND USSR
RELATIVE SIZE OF CAPITAL INVESTMENT IN TRANSPORT AND COMMUNICATIONS
1950-59



29488 1-61

D. Housing

In 10 years the USSR has trebled the volume of housing construction, whereas in the US the volume has fluctuated from a low of $13.8 billion in 1951, a year with a relatively low volume of housing construction, to a high of $20.9 billion in 1959 (see the chart, Figure 12*). In spite of the rapid Soviet growth in the volume of housing construction, now showing some sign of leveling out, the annual value of housing construction is currently only slightly more than one-half of that of the US. This situation is partly explained by the Soviet emphasis on low-cost multiple-unit types of housing. At present the US devotes a significantly larger share of construction effort to housing, about 43 percent in 1959 compared with about 33 percent for the USSR (see the chart, Figure 13*).

E. Other Investment

"Other" investment is too diverse in its composition to permit an easy analysis of trends, especially because it contains an admixture of military and civilian types of investment. In the US the civilian aspects -- such as schools, churches, and commercial buildings -- strongly outweigh the military aspects. The trend has been for investment in this sector to maintain its share of total US investment, some 25 percent in dollar terms (see the chart, Figure 1**).

In the USSR, "Other" investment, which presumably includes military construction, rose during the Korean War and declined absolutely during 1954 and 1955. During 1956 and subsequently, investment in this sector has risen steeply. The expansion of the trade net, the school construction program, the construction of urban utilities, and the erection of workers' clubs have been important characteristics of recent Soviet investment policy.

VI. Future Trends

Any forecast of future trends in the scale and structure of Soviet investment must rest on assumptions of specific policies and of policy objectives. Without such explicit assumptions, only broad historical trends can be observed -- yet it may be of value to look at these trends.

---

* Following p. 12.
** Following p. 6, above.

Given objectives requiring a rapid economic growth, given the fact of centralized control of the economy, and given some continuation of increases in consumer welfare, there is little reason to assume that the USSR in the near future will devote a lesser proportion of its national product to investment purposes. Indeed the likelihood is that an increased share will be so allocated and that rapid Soviet economic growth will continue.

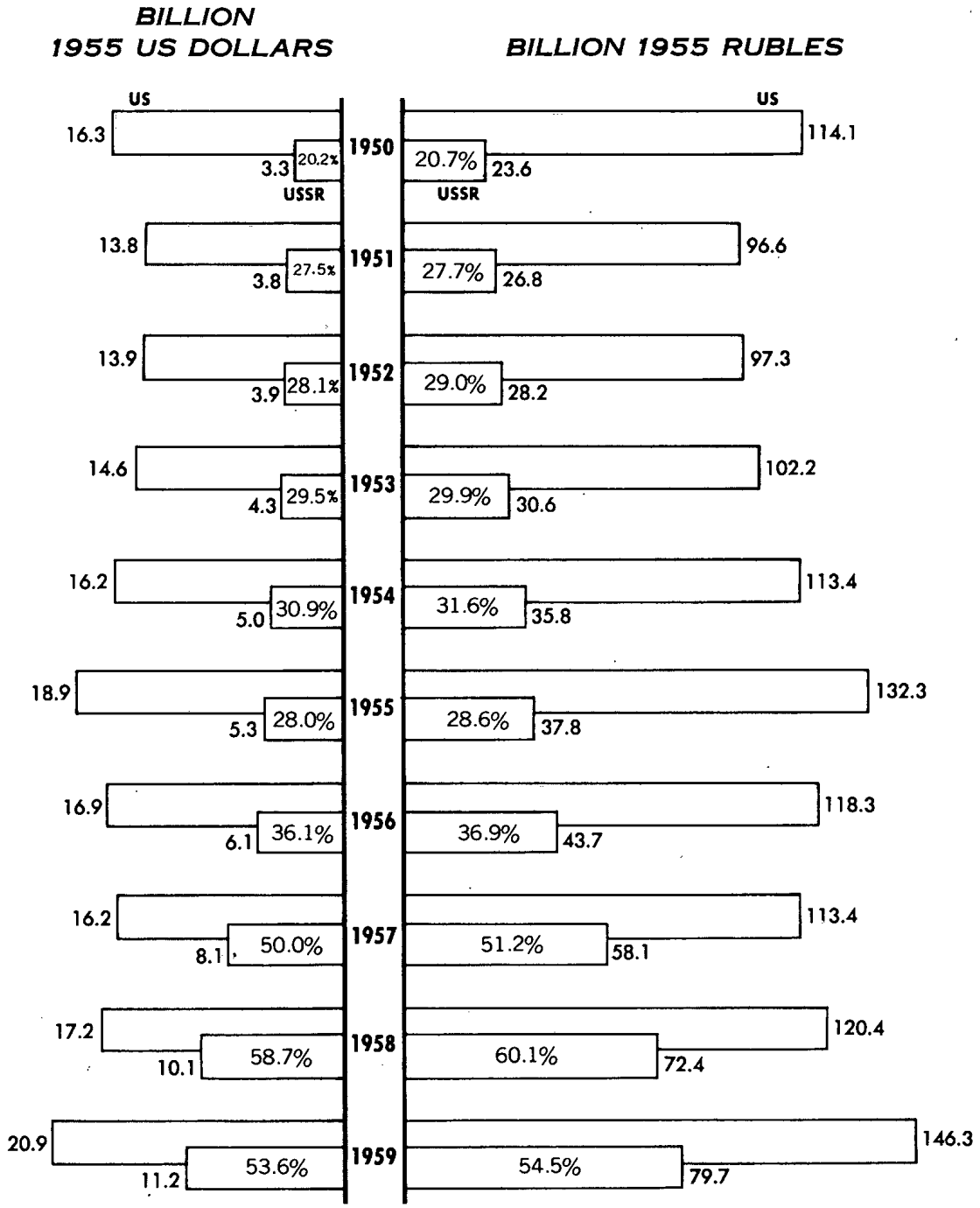
If one were obliged to estimate the future structure of Soviet investment, say in 1965, the structure in 1959 probably would serve as a good guide, although on the basis of varied evidence it would appear that the share of industrial investment is likely to increase somewhat and that the share of housing is likely to decrease slightly.

Figure 12

US AND USSR

RELATIVE SIZE OF CAPITAL INVESTMENT IN HOUSING

1950-59

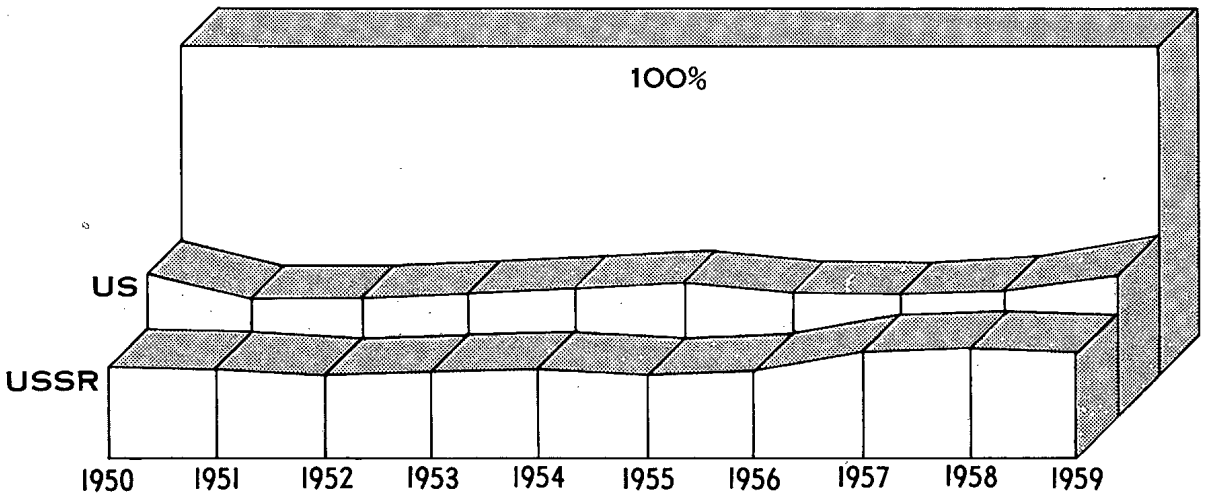


29489 1-61

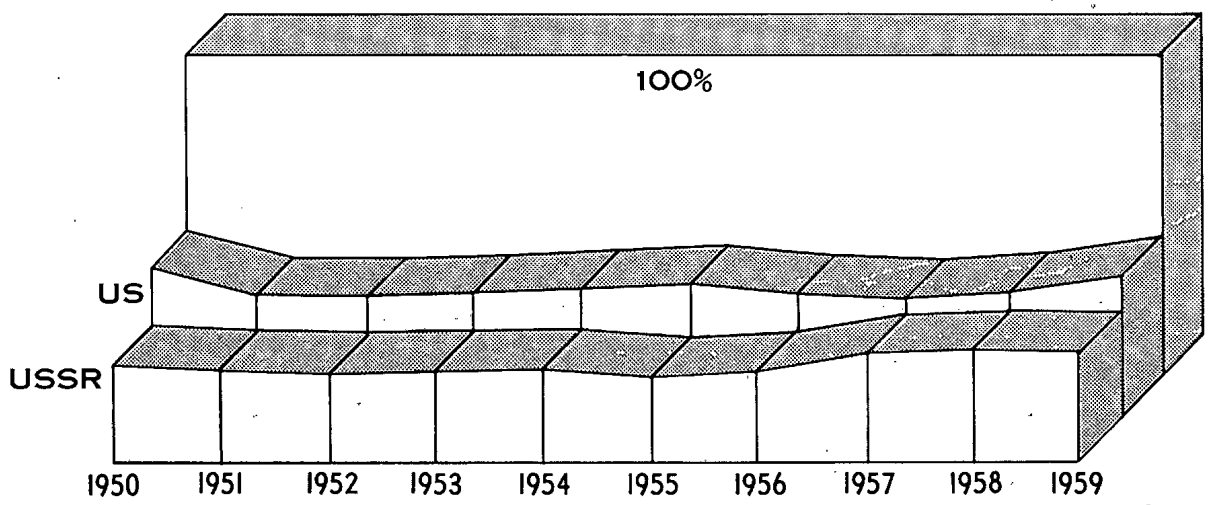
Figure 13

US AND USSR
HOUSING AS A PERCENT OF THE TOTAL CONSTRUCTION EFFORT
1950-59

PERCENT OF VALUE IN 1955 US DOLLARS



PERCENT OF VALUE IN 1955 RUBLES



29483 1-61

APPENDIX A

STATEMENT OF METHODOLOGY

In the analysis that is the intent of this report the methodologies employed must cope with two major problems: (1) the problem of comparability of definition, such as what constitutes "capital investment," "equipment," and "construction and assembly" work and what defines the various branches of the economy,* and (2) problems of finding a common denominator permitting comparison of the capital investment programs of the US and the USSR, such as dollars or rubles or some composite.** The latter presents deep conceptual problems, referred to in the Introduction.***

Because it has been useful to make the comparisons in terms of the time period 1950-59, there is a third problem that will not receive full consideration -- the index number problem, which is most relevant in the form of the question, "Would the Soviet index of capital investment and the indexes of its construction and equipment components behave the same if calculated by our methodologies as they do when calculated by their methodologies?" A similar question could be applied to the US indexes. Because only a 10-year period is under consideration and because it is believed that the methodological differences will not introduce excessive distortion within this time period, midinterval weights having been used, the problem is here noted but is not resolved.

The two final sections of this statement (1) treat the roles of the supporting tables in Appendix B and (2) consider the reliability of the data and the likelihood of bias in the data, with particular reference to the effect on the conclusions.

1. Definitions

a. Capital Investment

In both the US and the USSR, capital investment is defined as consisting of the initial acquisition or construction of productive real assets having an anticipated service life of at least 1 year. 5/ Capital investment is inclusive of capital replacement in both countries. With some exceptions, both exclude most outlays for maintenance and repair. 6/ A productive real asset is a form of tangible wealth

---

* See 1, below.
** See 2, below.
*** See I, p. 5, above.

that produces a stream of income, to an individual owner, a collective owner, or a society.

In practice the definition of capital investment becomes a matter of bookkeeping convention. Outlays for industrial plant and equipment are obviously classified as capital investment. The procurement of real assets (buildings, structures, and machinery and equipment) is included for other economic activities such as agriculture, transport and communications, commerce, and personal services. Because activities generating social gain are recognized, the acquisition of real assets by nonprofit institutions serving individuals is included, as is governmental acquisition of real assets in such forms as highways, educational real assets, and land development and improvement. Both countries apparently include construction and equipping of fixed military installations. The US statistics on governmental investment, however, exclude procurement of producer durables on government account, an item that may now amount to some $3 billion annually. In 1947, such procurement amounted to nearly half a billion dollars, and since then public construction has increased to more than four times the 1947 level. These government purchases include equipment for military facilities, for government production facilities, for government independent agencies, for administrative use, and for transport.

By convention, both countries classify the construction of housing as capital investment, although at this point the distinction between investment and consumption becomes less clear. In the West the rationale rests on the fact that housing, which can be rented, is certainly a real asset and that in many national accounts a rent is imputed to owner-occupied housing. Similar reasoning is not applied to consumer durables (such as refrigerators and television sets).

The procurement of automobiles for purposes other than private use provides a classification problem in the US, where such procurement is sizable. Until 1953, 30 percent of automobile sales were considered to be procurement of producer durables; after 1953, following new samplings of automobile sales patterns, such procurement was revised downward to 17 percent. 7/

In the USSR, which maintains a high degree of central planning, control, and audit of investment activities, data flows are relatively complete and are maintained according to relatively precise definitions, with the exceptions of private housing construction and, to some extent, kolkhoz investment.

In the US, data on investment activity tend to be more incomplete, and definitions tend to be less precise. The official series

compiled by the US Government for the acquisition of producer durable goods is estimated for reference years (census years) by means of the commodity flow technique 8/ that basically utilizes information on manufacturers' sales of equipment. For intervening years the sampling results of the Commerce-SEC Surveys of Business Expenditures on Plant and Equipment are utilized to establish trends from the most recent reference year for which the Census of Manufactures data are available. Construction estimates are derived from a host of diverse sources adjusted in various fashions, but the most important source is information on contract awards. Past information on housing construction has proved to be incomplete.* In addition, there is a tax incentive to conduct business construction on force account -- that is, using a plant's own labor force on current payroll rather than by using contract construction. The prevalence of this practice leads, of course, to a statistical understatement of construction activity. An effort is made by US statistical agencies to adjust for this understatement, but there is no very accurate means of estimating the requisite adjustment to include own force construction or, for that matter, the other adjustments that must be made.

b. Equipment

The equipment component of investment is defined rather similarly in both countries, but there are differences with respect to the inclusion of assembly costs. For the US, "equipment" is identified as consisting of producer durable goods, defined as equipment for multiple use in production with an average life of 1 year or longer. 9/ This identification excludes that equipment which is an integral part of a building or structure and which is commonly included in the construction contract price. 10/

The USSR also follows the 1-year criterion, adding a minimum value criterion as well (500 rubles) for instruments and office equipment.

A major difference in definition lies in the treatment of assembly and installation work. In the US, estimates of the value of equipment derived by the commodity flow method are based on data on the value of shipments, and the data include charges for installation work by employees of the plant of manufacture. 11/ In the USSR it is much less common to find field installation by employees of the producing plant, and usually installation-assembly costs are not classified as equipment expenditures but rather as part of construction expenditures (thus the compound category of "construction-assembly costs," which is used in Soviet statistics). 12/

* See the Wall Street Journal for 2 November 1959 on new census findings that construction of 1.5 million to 2 million houses was not recorded during 1950-56.

Various Soviet authors indicate that the expenditures on mechanical assembly work amount, on the average, to 10 to 15 percent of the uninstalled value of equipment. One source states that these expenditures amount to 7.0 to 8.3 percent of the value of all construction-assembly work, depending on the branch of industry -- an amount that is equivalent to 10 to 15 percent of equipment value. 13/ Another source states that inclusion of assembly costs with equipment costs would raise the over-all share of the latter from 48 percent of total industrial capital investment by another 5 or 6 points -- that is, 10 to 15 percent. 14/ The noncomparability of classification of assembly costs can be more serious for international comparisons of equipment costs in various individual industries, for the share varies widely. Because the US equipment data include assembly expenditures only when assembly work has been done by employees of the producing plant and because some installation is undertaken by others than these personnel, there should be less than a full adjustment to insure intercountry comparability. The extent of the necessary adjustment is unknown, but it seems probable that the Soviet equipment values are understated in this report by up to 10 percent through this difference in classifying installation costs.

Soviet investigations have led to a claim that there are further differences in classification for which adjustment should be made. It is claimed that US statistics classify various components, such as heating boilers, sanitary-technical systems, internal pipelines, and the like as equipment, while in the USSR these are classified as construction components. 15/ This claim appears to be excessive, however, because these components are integral to buildings and usually are installed by construction companies, being part of the construction contract in US practice.* Although the chance of some difference in classification exists, no significant adjustment appears necessary for intercountry comparison.

Both the US and the USSR classify as equipment various items of office furniture, cafeteria equipment, and the like. 16/ The Soviet term for the same class of commodities is inventar'.**

c. Construction

The principal difference in classification between the two countries lies in the Soviet inclusion of all on-site costs of assembly

* In the Annual Survey of Manufactures, 1956, published by the US Department of Commerce, Bureau of the Census, Washington, 1958, p. 219, these components are explicitly related to construction.
** For consolidated grouping of equipment, instruments, and inventar', see source 17/.

and installation. This subject has already been discussed in relation to the definition of equipment. In both countries, construction includes the erection of buildings, houses, and fixed structures. Because Soviet sources have occasionally disputed the fact that US statistics on construction include the cost of such fixed equipment as heating and ventilating equipment, it is useful to give the definition of New Plants and Structures as given on the reporting form for the US Annual Survey of Manufactures, 1956: "New Plants and Structures. Report total expenditures (on capital account) during 1956 for new construction and major alterations of buildings (including all new elevators, cranes, heating and ventilating equipment, essentially a part of the buildings), other fixed structures (such as blast furnaces, brick kilns, fractionating towers, shipways, and similar types of structures), and site improvements (such as roads, docks, tracks, parking lots, fences, utilities, etc.)." 18/

d. Sector Classification of the Economy

Because this report must rely on a limited amount of Soviet information as to the sectoral structure of investment, it has been necessary to follow the Soviet classification system and to reorganize the relevant US data according to the Soviet system. The following five-part classification system is used: (1) industry, (2) agriculture, (3) transport and communications, (4) housing, and (5) "Other."

(1) Industrial Investment

Industrial investment is defined as including capital investment in manufacturing, mining, oil and gas drilling, and public utilities (electric power and gas) to make US data correspond with the Soviet category.

(2) Agriculture

The US data on agriculture include capital investment in farm housing, farm nonhousing construction, agricultural producer durable equipment, and public expenditures on conservation and land development. The Soviet data include the above categories, with the exception of farm housing, and also include some rural services such as schools and hospitals.

(3) Transport and Communications

Both countries use similar definitions for the transport and communications sector. Capital investment in railroads, highways, shipping, civil aviation, trucking lines, and communications is included, with the exclusion in the US data of governmental procurement of transport equipment.

(4) Housing

The US data on housing include private nonfarm housing and public housing. The Soviet data include all state and private housing, rural and urban. Valuations for private housing are estimates.

(5) Other

On the US side the category "Other" is calculated as a residual term that includes investment in trade, services, finance, the construction industry, nonprofit institutions, urban transit, sewers, water supply, highways, education, science, health, and military facilities. Equivalent activities are included on the Soviet side with the sole exception of investment in the construction industry, which the USSR classifies as industrial investment. Because no adequate time-series is available for either country, giving capital investment in the construction industry, an adjustment could not be made. Investment in the construction materials industries is included, however, in data on US manufacturing investment (and thus is included in US industrial investment). The effect of all these inclusions and omissions on the interpretation of the intercountry comparisons is discussed elsewhere.*

2. Problems of Valuation

For comparing the investment programs of the two countries, two major problems of valuation exist. First, there is the problem of deflation to a constant ruble or constant dollar basis in each country. Second is the problem of pricing the investment program of each country in the monetary unit of the other. Because the price structures of each country are quite different, comparisons made in rubles give results quite different from comparisons made in dollars, and there is value in making both ruble and dollar comparisons.

a. Deflation

The US data given in current prices have been converted to 1955 dollars primarily by use of the implicit price deflators for construction -- (1) residential and (2) nonresidential -- and for producer durable equipment. 19/ These indexes were officially compiled with 1954 weights.

The published Soviet data for the most part have been valued in July 1955 rubles. In the case of the construction component, the input norms in the time series have been adjusted from time to time in accordance with increased efficiency of inputs.

* See p. 23, below.

The deflation techniques used by the US and Soviet governments in constructing construction volume indexes are of two distinct types, but the actual techniques used follow a similar bias by tending to understate somewhat the growth of construction output. The US deflation of construction utilizes a modified input-price index that has been adjusted partly to reflect change in the efficiency of inputs. Without the adjustment, application of an input type of deflator would definitely dampen the index of output in constant prices. Because the adjustment is at best incomplete, the volume index is still understated relative to an ideal output measure. The Soviet index measures changes in the volume of construction components for which input norms are established and is similar to an ideal output measure. The USSR, however, periodically revises downward these planned input norms and hence reduces the plan value for components,* an action that has the effect on the Soviet index of understating the growth of the volume of construction relative to an ideal final output measure. Each country tends to understate the growth of construction, and the main difference in the effect of the deflation technique is one of the degree of understatement of the volume increase. Because 1954 or 1955 weights are used, however -- approximately midinterval for the 1950-59 period being examined -- the index bias has been considered negligible.

Any judgment as to relative bias in the movements of the respective deflators hinges on two major factors: (1) the determination of the respective treatments of changes in the efficiency of inputs, particularly into the final products of construction work, and (2) the relative completeness of the statistical reporting of the two countries. Present evidence implies that the distortions involved in the deflation of the data of the two countries are not of such magnitude as to affect significantly the conclusions of this report.

b. Valuation Conversion

The transformation of ruble and dollar valuations respectively into the other currency has been accomplished by means of conversion ratios for construction (residential and nonresidential) and for equipment (adjusted ratios of equipment appropriate for individual sectors, such as the equipment used in industry, transport and communications, and agriculture).

For producer durable equipment the basic source is a RAND study giving ratios for individual items in 1955 prices.** The over-all ratio was obtained by weighting these individual ratios according to

* The plan value consists of the value of the product of the planned input norms times the planning prices of the inputs plus a nominal markup.

** See Appendix C.

weights derived from current research. Equipment ratios for each sector were obtained through inspection of a frequency distribution of the ratios for individual items and classes of equipment to seek representative ratios for the types of equipment appropriate to the sector. As a check, the calculated sector ratios were weighted by the value of equipment acquisitions within the respective sectors. The resulting over-all equipment ratio was found to be nearly identical with the aggregate ratio calculated on the basis of individual weights, a rough test of the accuracy of the sector ratios.

Comparisons of the volume of construction, in either dollars or rubles, yield about the same volume relationships (the Soviet as a percent of the US), primarily because the range of available ruble-dollar ratios for individual types of construction is narrow. Incidentally, there is relatively close correspondence between the ratios used in this report and the ratios that seemingly were used in a recent study done by Soviet authors (apparently using a ratio whereby 6 or 7 rubles of construction equal US $1 of construction).*

For equipment, however, Soviet acquisition is greater relative to that of the US when valued in dollars than when valued in rubles. This situation is the result of a heavy Soviet emphasis on the procurement of types of equipment that have relatively high dollar valuations in comparison with ruble valuations and in large part is the consequence of Soviet price policy whereby the use of relatively advanced equipment is encouraged by the establishment of relatively low prices. This practice tends to pass most of the economic benefits of such equipment to the industries utilizing the equipment rather than to those producing it and can be done because the research and development is largely covered by state grant, as is the expansion of plant and equipment in the producing industry. In the US, comparatively higher costs and markups would be assigned to such relatively advanced equipment. Thus the USSR tends to set very low prices (relative to their dollar counterparts) on chemical equipment and electrical control equipment.

The consequence of the differences in pricing practice for producer durables is that a dollar comparison of the value of Soviet and US equipment acquisition gives a higher figure for the USSR as a percent of the US than does a ruble comparison. Although it is common practice to split the difference, in effect through the use of the geometric mean of the ratios using Soviet weights and US weights as has been done in this report, a case can be made for casting some skepticism on the meaning of the ruble comparisons. Most Soviet economists readily admit that present Soviet prices for producer

* See IV, p. 8, above.

durable equipment do not provide a measure of the "social value" of such equipment -- that is, the price of the equipment tends to be set artificially low relative to potential revenue from its output or to the resource cost of the equipment. This practice distorts the use of Soviet prices as indicators of the relationships between relative demand and supply because highly preferred items (from the point of view of the economy) in short supply may be assigned relatively low prices and deprives an international comparison based on ruble prices of any great meaning.

3. Supporting Tables

The data presented in Figures 1 through 13* stem basically from the summary tables in Appendix B for the US and the USSR (Tables 1, 2, 9, and 10**). The other tables in Appendix B are supporting tables deriving the data presented in these four key tables.

Table 1 presents the dollar valuation of the structure of Soviet capital investment, by sector, 1950-59. Table 2 is the ruble valuation of Soviet capital investment, as derived from Tables 5 through 8. Table 4 summarizes the sectoral distribution of total Soviet capital investment. Subtraction from this investment of the estimated distribution of Soviet producer durable equipment (Table 3) derives the construction estimates utilized in Table 2. The remaining tables estimate Soviet capital investment in particular sectors of the economy, as follows: housing (Table 5), transport and communications (Table 6), agriculture (Table 7), and industry (Table 8).

Table 9 presents the ruble valuation of the structure of US capital investment, by sector, 1950-59. Table 10 is the dollar valuation of US capital investment, as derived from Tables 11 through 17. Table 11 gives the estimated structure of industrial investment, as derived from deflation of the current value estimates of the allocation of producer durable equipment to industry (Table 13) and from the constructed total industrial investment series in current values (Table 12). Table 13 gives the estimated distribution of producer durable equipment, by sector, in current values. The remaining tables estimate US capital investment in the other sectors, as follows: agriculture (Table 14), transport and communications (Table 15), housing (Table 16), and "Other" (Table 17). The latter is estimated residually.

---

* Figures 1, 2, and 3 follow p. 6, above; Figures 4, 5, 6, 7, and 8 follow p. 8, above; Figures 9, 10, and 11 follow p. 10, above; and Figures 12 and 13 follow p. 12, above.

** Pp. 27, 29, 39, and 41, respectively, below.

4. A Note on Bias and the Reliability of Data

This report undertakes a data comparison on the basis of information presently available and of methodologies susceptible to improvement and refinement. It is to be expected that both error and bias are present. It must be ascertained what effect these have on the conclusions.

For the US, given data include the total private acquisition of producer durable equipment, the total private and public construction, and data pertaining to the total investment, by sector, all in dollars. Some error results from the process of regrouping US data to conform with the Soviet sector classification. Additional error arises from the deflation of the current data to 1955 dollars. Finally, some error exists because the given data may be incomplete or imprecise.

Still with reference to the dollar valuation of US investment, a significant error is introduced in the process of allocating equipment by sector on the basis of incomplete data not originally classified in the way desired. This error in turn introduces error into the estimates of the sector allocation of construction.

The process of evaluating US investment in rubles introduces further error to the extent that the ruble-dollar ratios are incorrect or inappropriate.

On the Soviet side the totals for all investment, for construction, and for equipment acquisition were used as published, in 1955 rubles, for all years, and were affected only slightly by estimation procedures in deriving kolkhoz and private housing investment. The distribution of investment by sector for 1956-59 was available and was estimated, subject to control totals, for 1950-55. The distribution of equipment by sector is based on incomplete and imprecise information and thereby lends distortion to the estimate. The residual estimate, construction, by definition is distorted in the opposite direction.

The process of evaluating Soviet investment in dollars is subject to error to the extent that the ruble-dollar ratios are incorrect or inappropriate.

There remains to be considered the effect of possible bias in the estimates on the conclusions. The important comparisons of the relative size of total capital investment probably tend to understate the total for the US, for reasons of inadequate coverage in the official US series, especially for housing and "own force" construction.*

* See p. 15, above.

The comparisons of the total value of equipment are subject to two errors that may contribute to bias. The first error is definitional and tends to overstate the US valuation, which includes in the value of shipments certain installation and assembly expenses that the USSR includes as construction cost. The second error is associated with the ruble-dollar conversion and may tend to overstate the Soviet valuation, as the ruble-dollar ratios used in the equipment valuation conversion contain an inadequate sample of equipment made to specification, which if included in proper weight would likely raise the ruble-dollar ratio.

The comparisons of the volume of construction tend to understate the relative size of the US lead without significant consequence to the main conclusions. The understatement stems from incomplete data in the US official construction statistics and from the inclusion of certain assembly costs in the Soviet construction series, not classified as construction in the US series.

Within the sector comparisons, there are certain incomparabilities of definition that introduce bias. The US data on industrial investment exclude the construction industry (although including construction materials) whereas the Soviet industrial series does include it. The error is not serious for present purposes but is biased in one direction.

The US data on agricultural investment include relatively small expenditures on farm housing whereas the Soviet data include nonproductive investment made by the kolkhozes (such as clubs and schools).

The US housing series is incomplete and excludes farm housing construction, although the latter is a relatively minor item. Both the incompleteness and the exclusion tend to understate the US lead in housing construction.

The Soviet data on transport investment may not make full allowance for corvée labor used in the construction of roads and lead to an understatement of the relative size of the Soviet investment in the sector.

In any circumstances the comparisons pertaining to "Other" investment are relatively imprecise in the absence of a disaggregation on the Soviet side permitting more complete identification of the categories included.

An attempt has been made to prepare the conclusions of this report with full allowance for the imperfections of the data and for the methodological problems of international comparisons of the scale of investment programs.

APPENDIX B

STATISTICAL TABLES

Table 1

Structure of Soviet Capital Investment, in Dollars a/
1950-59

Billion 1955 US $

	1950			1951			1952			1953			1954			1955			1956			1957			1958			1959		
	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total
Total	9.9	11.6	21.5	10.0	13.7	23.7	10.4	15.4	25.8	10.7	16.5	27.2	12.9	19.1	32.0	15.6	21.4	37.0	19.7	23.5	43.2	22.1	26.1	48.2	25.2	31.0	56.2	28.7	34.9	63.6
Industry	6.1	4.5	10.6	5.7	5.6	11.3	5.9	6.6	12.5	6.3	7.3	13.6	7.2	8.8	16.0	8.9	9.6	18.5	11.8	9.3	21.1	13.6	9.8	23.0	16.1	10.3	26.4	18.0	11.9	29.9
Agriculture	1.6	1.3	2.9	1.9	1.6	3.5	1.9	1.8	3.7	1.9	1.9	3.8	1.1	2.4	3.5	3.9	3.7	7.6	4.3	3.8	8.1	4.5	3.9	8.4	4.4	4.9	9.3	5.1	5.0	10.1
Transport and communications	1.4	0.6	2.0	1.6	0.7	2.3	1.6	0.7	2.3	1.6	0.7	2.3	1.7	0.8	2.5	2.0	0.9	2.9	2.2	1.0	3.2	2.4	1.1	3.5	2.8	1.2	4.0	3.4	1.5	4.9
Housing	Negl.	3.3	3.3	Negl.	3.8	3.8	Negl.	3.9	3.9	Negl.	4.3	4.3	Negl.	5.0	5.0	Negl.	5.3	5.3	Negl.	6.1	6.1	Negl.	8.1	8.1	Negl.	10.1	10.1	Negl.	11.2	11.2
Other	0.8	1.9	2.7	0.8	2.0	2.8	1.0	2.4	3.4	0.9	2.3	3.2	0.9	2.1	3.0	0.8	1.9	2.7	1.4	3.3	4.7	1.6	3.8	5.4	1.9	4.5	6.4	2.2	5.3	7.5

a. See Table 2, p. 29, below. The factors used for the conversion of ruble valuations to 1955 US $ valuations are as follows:

	Machinery and Equipment	Construction-Assembly
Industry	0.35*	0.16*
Agriculture	0.22*	0.16**
Transport and communications	0.25*	0.12***
Housing	None	0.14*
Other	0.33†	0.14††

* See Appendix C.

** Given only the ratios for industry and for housing, in the absence of a specific ratio for agricultural construction, selection of a ratio must be arbitrary. It is felt that the ratio for agriculture may lie closer to 0.16 than to 0.14 because it is likely that agricultural construction, although less efficient in nature than industrial construction, may not be carried on the books at full cost, thus tending to understate the ruble value recorded for a given amount of agricultural construction. This bias is especially likely in the case of kolkhoz construction, where a large portion of the labor cost is believed to be recorded incompletely.

*** The ratio for highways, 6.5 to 1 (see Appendix C), was given a weight of 1, and the ratio for railroad construction, 9.0 to 1, was given a weight of 4. See the weights used in Table 3, footnote d, p. 32, below.

† The weighted-average conversion for all machinery and equipment was used.

†† The ratio for housing was used.

Table 2

Structure of Soviet Capital Investment, in Rubles a/
1950-59

Billion 1955 Rubles

	1950			1951			1952			1953			1954			1955			1956			1957			1958			1959		
	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total
Total	38.7	78.9	111.6	33.7	98.1	129.8	35.2	103.9	139.1	36.1	110.2	146.3	44.4	127.9	172.3	53.6	141.7	195.3	66.3	157.4	223.7	73.6	176.3	249.9	82.8	209.6	292.4	94.9	236.3	331.2
Industry	17.4	28.1	45.5	16.8	35.2	51.4	16.8	41.0	57.8	18.1	45.6	63.7	20.7	55.3	76.0	25.4	59.7	85.1	33.6	57.9	91.5	38.8	57.8	96.6	46.1	64.2	110.3	51.3	74.6	125.9
Agriculture	7.2	8.2	15.4	8.8	10.3	19.1	8.8	11.4	20.2	8.6	11.7	20.3	14.1	15.3	29.4	17.8	22.9	40.7	19.3	23.8	43.1	20.3	24.6	44.9	19.9	30.5	50.4	23.2	31.2	54.4
Transport and communications	5.7	5.3	11.0	6.2	5.8	12.0	6.6	6.0	12.6	6.6	6.1	12.7	6.9	6.4	13.3	8.0	7.4	15.4	9.0	8.4	17.4	9.7	8.9	18.6	11.1	10.3	21.4	13.6	12.6	26.2
Housing	Negl.	23.6	23.6	Negl.	26.8	26.8	Negl.	28.2	28.2	Negl.	30.6	30.6	Negl.	35.8	35.8	Negl.	37.8	37.8	Negl.	43.7	43.7	Negl.	50.1	50.1	Negl.	72.4	72.4	Negl.	79.7	79.7
Other	2.4	13.7	16.1	2.5	14.0	16.5	3.0	17.3	20.3	2.8	16.2	19.0	2.7	15.1	17.8	2.4	13.9	16.3	4.2	23.6	27.8	4.8	26.9	31.7	5.7	38.2	37.9	6.8	38.2	45.0

a. Total investment figures for each sector are from Table 4, p. 33, below; machinery and equipment figures are from Table 3, p. 31, below, and construction figures are derived residually. Total investment by sector has been published for 1956-58. Estimates for other years are reasonably firm. The estimation of the sector distribution of machinery and equipment and of construction has been done by techniques that do not insure accurate estimation of annual change -- for example, the annual growth of acquisition of machinery and equipment by industry. This table should be used only with awareness of the methodologies employed in the supporting tables.

Table 3

Acquisition of Soviet Machinery and Equipment, by Sector of the Economy 1950-59

Billion 1955 Rubles

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Total acquisition of machinery and equipment	32.7	33.7	35.2	36.1	44.4	53.6	66.3	73.6	82.8	94.9
State a/	31.1	31.9	33.1	33.5	40.9	49.6	61.4	69.5	78.4	85.3
Kolkhoz b/	1.6	1.8	2.1	2.6	3.5	4.0	4.9	4.1	4.4	9.6
Agriculture	7.2	8.8	8.8	8.6	14.1	17.8	19.5	20.3	19.9	23.2
State c/	5.6	7.0	6.7	6.0	10.6	13.8	14.6	16.2	15.5	13.6
Kolkhoz b/	1.6	1.8	2.1	2.6	3.5	4.0	4.9	4.1	4.4	9.6
Transport and communications d/	5.7	6.2	6.6	6.6	6.9	8.0	9.0	9.7	11.1	13.6
Other e/	2.4	2.5	3.0	2.8	2.7	2.4	4.2	4.8	5.7	6.8
Industry f/	17.4	16.2	16.8	18.1	20.7	25.4	33.6	38.8	46.1	51.3

a. Total state acquisition of machinery and equipment was derived from the following information:

Year	Equipment as a Percent of Total Investment*	Total Capital Investment** (Billion 1955 Rubles)	Implied Total Acquisition of Machinery and Equipment (Billion 1955 Rubles)
1950	33	94.2	31.1
1951	30	106.2	31.9
1952	28	118.3	33.1
1953	27	123.9	33.5
1954	28	145.9	40.9
1955	31	160.1	49.6
1956	33	186.2	61.4
1957	33	210.6	69.5
1958	32***	245.1***	78.4
1959	31***	275.0***	85.3

* Figures for 1950-57 are from source 20/, and figures for 1958-59 are from source 21/.
** Figures for 1950-57 are from source 22/, and figures for 1958-59 are from source 23/.
*** Percentages for 1958 and 1959 apply to redefined total expenditures, which include outlays for project-design work. The investment totals given in this table for 1958 and 1959 are those appropriate to the percentages and are not directly comparable with the figures given for preceding years. The figure of 275.0 billion rubles for 1959 was a preliminary estimate given in an earlier source and has not been changed on the basis of the slight official revision to 274.1 billion rubles.

b. Kolkhoz procurement of machinery and equipment, given in current rubles, has been converted to 1955 prices as follows:

Year	Outlays for Equipment (Billion Current Rubles)	General Equipment Price Index* (1956 = 100)	Outlays for Equipment (Billion 1 July 1955 Rubles)
1950	2.3**	140	1.6
1951	2.4***	136	1.8
1952	2.5**	121	2.1
1953	3.1**	121	2.6
1954	4.2**	121	3.5
1955	4.5***	112	4.0
1956	4.9†	100	4.9
1957	4.1††	100	4.1
1958	4.4†††	100	4.4
1959	9.6‡	100	9.6

* Based on an informal communication from Richard Moorsteen of the RAND Corporation, giving an index for 1950-56 in variable weights of the given year and dated July 1957. The figures given here assume that current costs for equipment in 1956 corresponded with the 1955 planning prices. The extension of the index through 1959 assumes that there has been no major price change.
** 24/
*** Estimated.
† 25/
†† 26/
††† Total kolkhoz acquisition of equipment in 1958 was 25.4 billion rubles, 27/ of which it is known that 21 billion rubles represented transferred machine tractor station (MTS) assets. 28/ Thus new investment in equipment was 4.4 billion rubles.
‡ Derived from footnote ††† and the 1958-59 total of 14 billion rubles given in the 1959 plan fulfillment.

Table 3

Acquisition of Soviet Machinery and Equipment, by Sector of the Economy 1950-59 (Continued)

c. Acquisitions of machinery and equipment were assumed to be 70 percent of state capital investment in agriculture (see Table 7, p. 36, below). There are two major pieces of evidence as follows: (1) in 1957, state productive capital investment in agriculture was 23.1 billion rubles (see Table 7), while state acquisition of equipment was 16.2 billion rubles, 29/ or 70 percent of the total, and (2) between 1 January 1951 and 1 January 1956 the MTS and sovkhoz holdings of machinery and equipment increased 29.2 billion rubles, while holdings of productive buildings and structures increased 9.3 billion rubles, 30/ yielding a factor of 76 percent expressing the share of machinery and equipment in total growth in productive assets.

d. Acquisition of machinery and equipment in transport and communications was assumed to be 52 percent of the total investment figures given in Table 6 (p. 35, below). The factor was derived from the following data:

Mode of Transport	Machinery and Equipment as a Percent of Total Productive Fixed Assets 31/ (1957)	Investment Weights 32/ (1954)
Railroads	46	Two-thirds
River and sea transport	78	One-sixth
Highways and trucking	50 (Estimated)	One-sixth
Total transport	52	

e. Acquisition of machinery and equipment for the "Other" sector was assumed to be 15 percent of such investment. This machinery and equipment would consist largely of purchases for education, health facilities, urban utilities, and trading organizations. In the year 1957, for example, the estimated acquisition of machinery and equipment is 4.8 billion rubles, while the known acquisition of equipment for education and health was 3.4 billion rubles. 33/ In this sector, acquisition of inventar' (see p. 16, above) must be presumed to be of significant extent, and thus much of the acquisition of "machinery and equipment" may take the actual form of desks and chairs.

f. The acquisition of machinery and equipment for industry was calculated as a residue. As a cross-check, the annual average for such acquisition during 1951-55 was given by a Soviet text 34/ and yielded a 5-year total of 95 billion 1955 rubles. The residual series, which does include some insignificant (at that time) decentralized acquisition of machinery, yields a total of 97.2 billion rubles for the same period. It is generally true for this table that the 10-year totals for 1950-59 are more accurate than a figure for any sector in any given year.

Table 4

Derivation of the Sectoral Structure of Soviet Capital Investment
1950-59

Billion 1955 Rubles

Sector of the Economy	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Total capital investment	111.6	125.8	139.1	146.3	172.3	195.3	223.7	249.9	292.4	331.2
Total state and decentralized a/	94.2	106.2	118.3	123.9	145.9	160.1	186.2	210.6	239.5	268.0
Total kolkhoz b/	7.4	9.1	10.6	11.7	14.3	21.0	22.4	21.8	28.2	35.0
Total private housing c/	10.0	10.5	10.2	10.7	12.1	14.2	15.1	17.5	24.7	28.2
Industry d/	45.5	51.4	57.8	63.7	76.0	85.1	91.5	96.6	110.3	125.9
Agriculture b/	15.4	19.1	20.2	20.3	29.4	40.7	43.3	44.9	50.4	54.4
Transport and communications e/	11.0	12.0	12.6	12.7	13.3	15.4	17.4	18.6	21.4	26.2
Housing c/	23.6	26.8	28.2	30.6	35.8	37.8	43.7	58.1	72.4	79.7
Other f/	16.1	16.5	20.3	19.0	17.8	16.3	27.8	31.7	37.9	45.0

a. Figures are from source 35/ except those for 1959, which are from source 36/.
b. See Table 7, p. 36, below.
c. See Table 5, p. 34, below.
d. See Table 8, p. 37, below.
e. See Table 6, p. 35, below.
f. Derived as a residue.

Table 5

Derivation of Soviet Capital Investment in Housing 1950-59

Year	State and Cooperative Housing Investment a/ (Billion 1955 Rubles)	Private Housing: Urban: Total Floorspace b/ (Million Square Meters)	Private Housing: Urban: Investment c/ (Billion 1955 Rubles)	Private Housing: Rural: Number of Houses d/ (Thousand)	Private Housing: Rural: Investment e/ (Billion 1955 Rubles)	Total Capital Investment in Housing (Billion 1955 Rubles)
1950	13.6	6.4	4.0	400	6.0	23.6
1951	16.3	7.3	4.5	400	6.0	26.8
1952	18.0	7.4	4.6	370	5.6	28.2
1953	19.9	7.6	4.7	400	6.0	30.6
1954	23.7	8.1	5.0	470	7.1	35.8
1955	23.6	8.4	5.2	600	9.0	37.8
1956	28.6	7.4	4.6	700	10.5	43.7
1957	40.6	9.5	5.9	770	11.6	58.1
1958	47.7	20.5	12.7	800	12.0	72.4
1959	51.5	22.6	14.0	950	14.2	79.7

a. The following estimates were derived with the assistance of very limited data from source 37/ and yield a 1951-55 total of 98.9 billion rubles (in 1950 rubles): for 1950, 13.2 billion rubles; for 1951, 15.9 billion; for 1952, 17.5 billion; for 1953, 19.4 billion; for 1954, 23.1 billion; and for 1955, 23.0 billion. Another source gives a 1951-55 total of 101.6 billion rubles in 1955 prices. 38/ This figure yields a factor of 1.027 for conversion from 1950 rubles to 1955 rubles; the increase in construction planned costs was related to wage increases and new regional materials prices. Data in the table for 1951-55 have been converted to the 1955 price base. Data for 1956-58 were given in source 39/. Very low reliability attaches to the 1951-55 estimates, which pertain to a period of tight control over release of information and are based on very fragmentary information.

The 1959 figure for state housing is derived from the figure of 52.7 billion rubles given in source 40/, adjusted to remove project-design expenditures, which this source, unlike the sources for the other years, includes in the sector breakdown. From a comparison of sources 41/ and 42/ for 1957 and 1958, it was determined that the project-design expenditures of those years were distributed as follows: industry, 40.7 percent; agriculture, 8.3 percent; transport and communications, 15.7 percent; housing, 20.4 percent; and "Other," 14.8 percent. These percentages were applied to the 1959 total of 6.1 billion rubles for project design to determine the approximate extent by which the 1959 sector figures would be reduced.

b. Data for 1950-58 are from source 43/, with adjustment to the figures for 1956-58. This adjustment stems from the fact that in 1956 approximately 100,000 housing units, or 4 million square meters of space, were reclassified as urban private housing rather than rural, and the new classification was followed in subsequent years. This adjustment involved housing for the machine tractor stations (MTS's), sovkhozes, and lumbering settlements. To increase comparability of the series, 4 million square meters of housing have been deducted from the published urban figures for 1956-59 for each year, and 100,000 houses have been added to the rural totals for each year. The 1959 figure is the published figure of 26.6 million square meters less the adjustment. 44/

c. The space series has been converted to value terms through use of an estimated valuation for 1955 of 620 rubles per square meter. This estimate is derived from the cost per square meter of living space of a standard, well-equipped 2-story house -- 850 rubles. 45/ Living space is estimated to be 73 percent of total space on the basis of 1955 data giving average urban living space as 5.4 square meters out of housing space of 7.4 square meters. 46/

d. Figures for 1950-55 are from source 47/. The total for 1956, believed to include MTS and sovkhoz housing, is from source 48/, and the total for 1957, which also is believed to include MTS and sovkhoz housing, is from source 49/. The total for 1958 is from source 50/ and has been adjusted by the addition of 100,000 units. The total for 1959 51/ has been adjusted similarly (see footnote b, above).

e. For valuation, a factor of 15,000 rubles per house has been used as representing 1955 costs. This figure is approximately midway between the amount of state loan funds available for purchase of material (10,000 rubles) and an average valuation used for 1959-65 planning. 52/ The latter figure is believed to overstate the quality of materials and labor inputs utilized.

Table 6

Derivation of Soviet Capital Investment
in Transport and Communications
1950-59

Billion 1955 Rubles

Year	Investment
1950	11.0 a/
1951	12.0 b/
1952	12.6 b/
1953	12.7 c/
1954	13.3 d/
1955	15.4 e/
1956	17.4 f/
1957	18.6 f/
1958	21.4 f/
1959	26.2 g/

a. Estimated with reference to the 1946-50 average of more than 9 billion rubles. 53/

b. After estimation of investments in 1953-55 (see footnotes c, d, and e, below), 24.6 billion rubles remained of the 1951-55 total of 66 billion rubles. 54/ This sum was allocated between the 2 years as shown, on the basis of fragmentary information.

c. It is known that the 1953 plan (in 1950 rubles) for centralized investment in transport and communications was 17.4 billion rubles. 55/ This figure has to be adjusted to remove nonproductive investments, to add decentralized productive investment, to allow for underfulfillment, and to correct the price basis. The price adjustment factor is estimated to be 0.9 for conversion to the 1955 rubles used herein. Data for 1956 permit derivation of a rough factor for the other adjustments; in that year, planned centralized investment in the sector, including nonproductive investment, was 21.5 billion rubles (1955 rubles). 56/ Reported actual investment (productive only), including decentralized investment, amounted to 17.4 billion rubles. 57/ The ratio of the latter to the former was 80.9 percent; this is designated as the coverage and fulfillment conversion ratio. Application of the coverage and fulfillment conversion ratio and of the price basis ratio to the 1953 plan of 18.8 billion rubles yields the estimate of 12.7 billion rubles carried above ($17.4 \times 0.9 \times 0.809 = 12.7$).

d. The planned increase in investment in 1954 was 5 percent. 58/ This increase has been applied to the 1953 estimate.

e. This figure was estimated on the basis of its being the midpoint between the 1954 estimate and the given 1956 figure.

f. 59/

g. The figure given in source 60/ was adjusted to remove project-design costs as explained in Table 5, footnote a, p. 34, above.

Table 7

Derivation of Soviet Capital Investment in Agriculture
1950-59

Billion 1955 Rubles

Year	State	Kolkhoz	Total
1950	8.0 a/	7.4 b/	15.4
1951	10.0 c/	9.1 b/	19.1
1952	9.6 c/	10.6 b/	20.2
1953	8.6 d/	11.7 b/	20.3
1954	15.1 d/	14.3 b/	29.4
1955	19.7 d/	21.0 b/	40.7
1956	20.9 e/	22.4 b/	43.3
1957	23.1 e/	21.8 b/	44.9
1958	22.2 e/	28.2 b/	50.4
1959	19.4 f/	35.0 f/	54.4

a. Estimated with reference to the fact that the 1946-50 average annual investment was 5 billion rubles and that for 1951-55, 12.6 billion rubles. 61/

b. 62/

c. Subtraction of the derived estimates for 1953-55 (footnote d, below) from the total of 63 billion rubles for 1951-55 63/ leaves a total of 19.6 billion rubles for 1951 and 1952. On the basis of various information this total was distributed in the fashion indicated. A new source 64/ gives somewhat different figures for 1951-58 from those given in the source of the control figures used in this report, but the data given for 1951 and 1952 tend to substantiate the estimates made for these years. The figures in the new source are as follows: for 1951, 10.2 billion rubles; for 1952, 9.7 billion rubles; for 1953, 8.8 billion rubles; for 1954, 15.4 billion rubles; for 1955, 21.2 billion rubles; for 1956, 21.2 billion rubles; for 1957, 23.4 billion rubles; and for 1958, 22.8 billion rubles. It is probable that these figures include the value of project-design work, accounting for the difference.

d. Source 65/ gives annual totals for 1953 and subsequent years of state and kolkhoz investment. Subtraction of the kolkhoz figures, given elsewhere in the same source, yields the figures carried here.

e. 66/

f. Source 67/, adjusted as indicated in Table 5, footnote a, p. 34, above.

Table 8

Derivation of Soviet Capital Investment in Industry
1950-59

Billion 1955 Rubles

Year	Investment
1950	45.5 a/
1951	51.4 a/
1952	57.8 a/
1953	63.7 a/
1954	76.0 a/
1955	85.1 a/
1956	91.5 b/
1957	96.6 b/
1958	110.3 b/
1959	125.9 c/

a. Although absolute figures have been given for 1956-58 (see footnote b, below), only a 5-year total has been given for 1951-55. This total has been broken out among its component years by use of the time series on industrial productive fixed assets given in source 68/. The time series on industrial fixed assets (1940 = 100) is as follows: 1949, 139; 1950, 154; 1951, 171; 1952, 190; 1953, 211; 1954, 236; 1955, 264; 1956, 293; and 1957, 325. The annual increments in points, expressed as an index of the 1950 increment, are as follows: 1950, 100; 1951, 113; 1952, 127; 1953, 140; 1954, 167; 1955, 187; 1956, 193; and 1957, 213.

The total for industrial productive capital investment during 1951-55 is 334.1 billion rubles. 69/ Assuming that the annual investments moved similarly to the increments in fixed assets, the years can be broken out by solving the following equation, which also gives 1950 as x:

$$1.13x + 1.27x + 1.40x + 1.67x + 1.87x = 334.1$$
$$7.34x = 334.1$$
$$x = 45.5$$

A very important cross-check on the basic assumption can be made by comparing the given figures for 1956 and 1957 with the estimates derived for those years by use of this method. The fixed asset increment in 1956 is 1.93 of that in 1950, implying the assumption of a capital investment of 87.8 billion rubles (45.5 x 1.93) in 1956. Actual capital investment was 91.5 billion rubles, 70/ which indicates a 4 percent error. The fixed asset increment in 1957 is 2.13 of that in 1950, implying the assumption of a capital investment of 96.9 billion rubles in 1957. Actual capital investment was 96.6 billion rubles, 71/ which is a negligible error.

b. 72/

c. Source 73/, adjusted as indicated in Table 5, footnote a, p. 34, above.

Table 9

Structure of US Capital Investment, in Rubles a/
1950-59

Billion 1955 Rubles

Sector of the Economy	1950			1951			1952			1953			1954			1955			1956			1957			1958			1959		
	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total
Total	138.8	248.5	386.7	133.2	250.8	384.0	131.0	259.1	390.1	138.3	270.5	408.8	126.7	289.7	416.4	144.1	317.2	461.3	154.3	306.2	460.5	148.6	302.6	451.2	126.0	312.6	438.6	138.6	337.0	475.6
Industry	36.0	36.0	72.0	43.6	44.6	88.2	43.6	50.8	94.4	43.2	57.0	100.2	42.4	50.8	93.2	40.8	55.8	96.6	49.6	59.3	109.1	52.8	60.1	112.9	31.2	64.5	95.7	36.0	53.3	89.3
Agriculture	21.7	18.6	40.3	21.7	18.6	40.3	19.6	18.6	38.2	20.2	16.1	36.4	16.8	14.9	31.7	17.5	14.3	31.8	14.7	13.6	28.3	14.0	14.3	28.3	16.8	14.3	31.1	16.8	14.9	31.7
Transport and communications*	13.5	25.2	38.7	14.9	27.3	42.2	15.8	28.7	44.5	15.8	30.8	46.6	13.5	35.7	49.2	14.8	35.7	50.5	18.0	37.8	55.8	14.8	39.9	54.7	14.0	42.0	56.0	15.8	43.4	59.2
Housing	Negl.	114.1	114.1	Negl.	96.6	96.6	Negl.	97.3	97.3	Negl.	102.2	102.2	Negl.	113.4	113.4	Negl.	132.3	132.3	Negl.	118.3	118.3	Negl.	113.4	113.4	Negl.	120.4	120.4	Negl.	146.3	146.3
Other	67.0	54.6	121.6	53.0	63.7	116.7	52.0	63.7	115.7	59.0	64.4	123.4	54.0	74.9	128.5	71.0	79.1	150.1	72.0	77.0	149.0	67.0	74.9	141.9	64.0	71.4	135.4	70.0	79.1	149.1

a. See Table 10, p. 41, below. Ruble-dollar conversion ratios were as follows:

	Machinery and Equipment	Construction-Assembly
Industry	4	6.2
Agriculture	7	6.2
Transport and communications	4.5	7.0*
Housing	None	7.0
Other	10	7.0

* The ratio for transport construction of 7.0 was derived by giving a weight of 4 to the highway construction ratio of 6.5 to 1 and a weight of 1 to railroad construction (9.0 to 1) (see Appendix C and Table 15, p. 47, below).

Table 10

Structure of US Capital Investment, in Dollars
1950-59

Billion 1955 US $

Sector of the Economy	1950			1951			1952			1953			1954			1955			1956			1957			1958			1959		
	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total	Machinery and Equipment	Construction-Assembly	Total
Total	21.8	36.5	58.3	22.6	37.0	59.6	22.4	38.3	60.7	23.1	40.0	63.1	21.4	42.6	64.0	23.1	46.6	69.7	25.7	45.1	70.8	25.2	44.6	69.8	19.7	46.1	65.8	21.9	49.4	71.3
Industry a/	9.0	5.8	14.8	10.9	7.2	18.1	10.9	8.2	19.1	10.8	9.2	20.0	10.6	8.2	18.8	10.2	9.0	19.2	12.4	9.6	22.0	13.2	9.7	22.9	7.8	10.4	18.2	9.0	8.6	17.6
Agriculture b/	3.1	3.0	6.1	3.1	3.0	6.1	2.8	3.0	5.8	2.9	2.6	5.5	2.4	2.4	4.8	2.5	2.3	4.8	2.1	2.2	4.3	2.0	2.3	4.3	2.4	2.3	4.7	2.4	2.4	4.8
Transport and communications c/	3.0	3.6	6.6	3.3	3.9	7.2	3.5	4.1	7.6	3.5	4.4	7.9	3.0	5.1	8.1	3.3	5.1	8.4	4.0	5.4	9.4	3.3	5.7	9.0	3.1	6.0	9.1	3.5	6.2	9.7
Housing d/	Negl.	16.3	16.3	Negl.	13.8	13.8	Negl.	13.9	13.9	14.6	14.6	14.6	Negl.	16.2	16.2	Negl.	18.9	18.9	Negl.	16.9	16.9	Negl.	16.2	16.2	Negl.	17.2	17.2	Negl.	20.9	20.9
Other e/	6.7	7.8	14.5	5.3	9.1	14.4	5.2	9.1	14.3	5.9	9.2	15.1	5.4	10.7	16.1	7.1	11.3	18.4	7.2	11.0	18.2	6.7	10.7	17.4	6.4	10.2	16.6	7.0	11.3	18.3

a. See Table 11, p. 43, below.
b. See Table 14, p. 46, below.
c. See Table 15, p. 47, below.
d. See Table 16, p. 48, below.
e. See Table 17, p. 49, below.

Table 11

Deflation of US Capital Investment in Industry to 1955 Dollars
1950-59

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Total industrial capital investment a/ (billion current US $)	12.6	16.8	18.1	19.2	18.2	19.2	23.5	25.7	20.8	20.7
Equipment b/ (billion current US $)	7.8	10.3	10.4	10.4	10.3	10.2	13.2	14.9	9.1	10.7
Deflator c/ (1955 = 100)	86.7	94.3	95.0	96.5	97.5	100.0	106.2	112.9	116.0	118.5
Equipment (billion 1955 US $)	9.0	10.9	10.9	10.8	10.6	10.2	12.4	13.2	7.8	9.0
Construction d/ (billion current US $)	4.8	6.5	7.7	8.8	7.9	9.0	10.3	10.8	11.7	10.0
Deflator e/ (1955 = 100)	82.5	90.2	93.5	95.8	96.9	100.0	107.3	111.7	112.8	116.1
Construction (billion 1955 US $)	5.8	7.2	8.2	9.2	8.2	9.0	9.6	9.7	10.4	8.6
Total industrial capital investment (billion 1955 US $)	14.8	18.1	19.1	20.0	18.8	19.2	22.0	22.9	18.2	17.6

a. See Table 12, p. 44, below.
b. See Table 13, p. 45, below.
c. 74/. The deflator for producer durable equipment was used.
d. Derived as a residue by subtracting equipment from total.
e. 75/. The deflator for nonresidential construction was used.

Table 12

Structure of US Capital Investment in Industry 1950-59

Million Current US $

Branch of Industry	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Group A a/	11,038	15,079	16,524	17,652	16,684	17,684	21,751	23,948	19,261	18,973
Primary iron and steel b/	599	1,198	1,511	1,210	754	863	1,268	1,722	1,192	1,036
Primary nonferrous b/	134	310	512	412	246	214	412	814	441	313
Electrical machinery and equipment b/	245	373	386	475	439	436	603	599	459	519
Machinery except electrical b/	411	683	701	797	694	809	1,078	1,275	915	909
Motor vehicles and equipment b/	510	851	855	989	1,295	1,128	1,689	1,058	558	641
Other transportation equipment b/	82	219	211	180	191	274	440	544	370	390
Stone, clay, and glass b/	280	397	330	346	361	498	686	572	399	529
Other durable goods b/	874	1,136	1,107	1,239	1,110	1,214	1,447	1,438	1,135	1,436
Paper and allied products b/	327	420	364	409	455	518	801	811	578	630
Chemicals and allied products b/	771	1,247	1,386	1,428	1,130	1,016	1,455	1,724	1,320	1,235
Petroleum and coal products b/	1,587	2,102	2,535	2,668	2,684	2,798	3,135	3,453	2,431	2,491
Rubber products b/	102	150	154	161	131	150	201	200	134	190
Mining b/	707	929	985	986	975	957	1,241	1,243	941	987
Oil and gas drilling c/	1,100	1,400	1,600	1,800	2,000	2,500	2,400	2,300	2,300	2,000
Public utilities (electric power and gas) d/ b/	3,309	3,664	3,887	4,552	4,219	4,309	4,895	6,195	6,088	5,667
Group B a/	1,569	1,766	1,580	1,594	1,547	1,521	1,739	1,749	1,501	1,748
Food and beverages b/	760	853	769	812	765	718	799	850	742	825
Textile mill b/	450	531	434	378	331	366	465	408	288	412
Other nondurable goods b/	359	382	377	404	451	437	475	491	471	511
Total industry	12,607	16,845	18,104	19,246	18,231	19,205	23,490	25,697	20,762	20,721

a. The industries are classified by the US system; the A and B groupings are a Soviet grouping used here to facilitate possible comparison with Soviet industrial investment statistics.
b. Data for 1950-57 are from source 76/, for 1958 from source 77/, and for 1959 from source 78/.
c. The methodology followed in making the estimates for this category does not insure that there is no duplication with the category "Petroleum and coal products." The duplication is believed to be relatively minor, however, and omission of the category would lead to an understatement of industrial investment. Entries for 1950-59 were estimated as the residual between the National Income Division (NID) series of the US Department of Commerce for new construction, which includes expenditures for gas and oil drilling, and the Office of Business Economics (OBE) series of the US Department of Commerce, which excludes these expenditures. See Tables D1 and D31 in source 79/.
d. The USSR classifies a portion of this category as communal investment and not as industrial investment.

Table 13

Sector Allocation of US Producer Durable Equipment a/
1950-59

Billion Current US $

Sector of the Economy	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Total b/	18.9	21.3	21.3	22.3	20.8	23.1	27.2	28.5	22.9	26.1
Farm equipment c/	2.7	2.9	2.7	2.8	2.3	2.5	2.2	2.3	2.8	2.9
Transport and communications d/	2.6	3.1	3.3	3.4	2.9	3.3	4.2	3.7	3.6	4.2
Other e/	5.8	5.0	4.9	5.7	5.3	7.1	7.6	7.6	7.4	8.3
Industry f/	7.8	10.3	10.4	10.4	10.3	10.2	13.2	14.9	9.1	10.7

a. The classification of allocations by sector of the economy is relatively arbitrary inasmuch as a commodity classification for the private purchases of producer durable equipment has been published only for 1946-54 and not for subsequent years. The data derived herein are used primarily for weighting purposes and for crude comparisons with the USSR.
b. 80/
c. 81/
d. Derived in Table 15, p. 47, below.
e. Calculated as 39 percent of the total for "Other" (see Table 17, p. 49, below), on the basis of sales of office and store machines, service industry and household machines, miscellaneous equipment, and passenger cars allocated to business during 1950-54. 82/
f. Derived as a residue. The figure for 1959 represents 52 percent of industrial capital investment (see Table 11, p. 43, above) and appears to be a reasonable relationship. McGraw-Hill reports a higher share for equipment in manufacturing investment.

Table 14

Derivation and Deflation of US Capital Investment in Agriculture
1950-59

Sector of the Economy	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Total agriculture (rounded billion current US $)	5.3	5.7	5.5	5.4	4.8	4.8	4.6	4.9	5.4	5.8
Farm equipment a/ (billion current US $)	2.7	2.9	2.7	2.8	2.3	2.5	2.2	2.3	2.8	2.9
Housing b/ (billion current US $)	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.8	0.8	0.8
Nonhousing construction c/ (billion current US $)	0.8	0.9	1.0	0.9	0.8	0.8	0.9	0.8	0.8	0.9
Public expenditure on conservation and development d/ (billion current US $)	0.9	0.9	0.9	0.9	0.8	0.7	0.8	1.0	1.0	1.1
Farm equipment deflator e/ (producer durable equipment deflator used) (1955 = 100)	86.7	94.3	95.0	96.5	97.5	100.0	106.2	112.9	116.0	118.5
Housing deflator f/ (1955 = 100)	88.3	94.7	97.4	98.3	97.1	100.0	105.8	107.6	107.9	110.7
Nonresidential construction deflator g/ (used for nonhousing construction and conservation/development) (1955 = 100)	82.5	90.2	93.5	95.8	96.9	100.0	107.3	111.7	112.8	116.1
Farm equipment (billion 1955 US $)	3.1	3.1	2.8	2.9	2.4	2.5	2.1	2.0	2.4	2.4
Housing (billion 1955 US $)	0.9	1.0	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7
Nonhousing construction (billion 1955 US $)	1.0	1.0	1.1	0.9	0.8	0.8	0.8	0.7	0.7	0.8
Public expenditure on conservation and development (billion 1955 US $)	1.1	1.0	1.0	0.9	0.8	0.7	0.7	0.9	0.9	0.9
Total agriculture (billion 1955 US $)	6.1	6.1	5.8	5.5	4.8	4.8	4.3	4.3	4.7	4.8

a. 83/
b. Data for 1950-56 are from source 84/; data for 1957-59 are estimated as a share of farm construction.
c. Derived by subtracting data for housing from totals on farm construction given in source 85/.
d. 86/
e. 87/. A comparison of price movements for tractors and other agricultural machinery 88/ indicated that the index for producer durable equipment was appropriate.
f. 89/. The deflator for nonfarm housing was used.
g. 90/

Table 15

Derivation and Deflation of US Capital Investment in Transport and Communications
1950-59

Sector of the Economy	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Total transport and communications (rounded, billion current US $)	5.6	6.6	7.1	7.6	7.8	8.4	10.0	11.1	10.4	11.4
Railroads (billion current US $) a/	1.1	1.5	1.4	1.3	0.9	0.9	1.2	1.4	0.8	0.9
Other private transport (billion current US $) b/	1.2	1.5	1.5	1.6	1.5	1.6	1.7	1.8	1.5	2.0
Highways (billion current US $) c/	2.1	2.4	2.7	3.0	3.7	3.9	4.4	4.9	5.5	5.8
Communications (billion current US $) d/	1.1	1.3	1.5	1.7	1.7	2.0	2.7	3.0	2.6	2.7
Construction component:										
Railroads (billion current US $) e/	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3
Highways (billion current US $) as above	2.1	2.4	2.7	3.0	3.7	3.9	4.4	4.9	5.5	5.8
Other (estimated f/) (billion current US $) f/	0.6	0.7	0.7	0.8	0.8	0.8	1.0	1.1	1.0	1.1
Total construction (billion current US $)	3.0	3.5	3.8	4.2	4.9	5.1	5.8	6.4	6.8	7.2
Construction deflator (nonresidential construction) g/ (1955 = 100)	82.5	90.2	93.5	95.8	96.9	100.0	107.3	111.7	112.8	116.1
Total construction (billion 1955 US $)	3.6	3.9	4.1	4.4	5.1	5.1	5.4	5.7	6.0	6.2
Total equipment (total less construction) (billion current US $)	2.6	3.1	3.3	3.4	2.9	3.3	4.2	3.7	3.6	4.2
Equipment deflator (producer durable equipment) h/ (1955 = 100)	86.7	94.3	95.0	96.5	97.5	100.0	106.2	112.9	116.0	118.5
Total equipment (billion 1955 US $)	3.0	3.3	3.5	3.5	3.0	3.3	4.0	3.3	3.1	3.5
Total transport and communications (billion 1955 US $)	6.6	7.2	7.6	7.9	8.1	8.4	9.4	9.0	9.1	9.7

a. 91/
b. 92/
c. 93/
d. 94/
e. 95/ 1958 and 1959 are estimated.
f. Estimated to be one-tenth of total capital investment in transport and communications. This is roughly equivalent to one-fourth of total investment in "Other private transport" and "Communications."
g. 96/
h. 97/

Table 16

Derivation and Deflation of US Capital Investment in Housing
1950-59

Sector of the Economy	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Total housing (billion current US $)	14.4	13.1	13.5	14.4	15.7	18.9	17.9	17.4	18.6	23.1
Private residential nonfarm a/ (billion current US $)	14.1	12.5	12.8	13.8	15.4	18.7	17.7	17.0	18.0	22.4
Public housing b/ (billion current US $)	0.3	0.6	0.7	0.6	0.3	0.2	0.2	0.4	0.6	0.7
Deflator for residential nonfarm construction c/ (1955 = 100)	88.3	94.7	97.4	98.3	97.1	100.0	105.8	107.6	107.9	110.7
Total housing (billion 1955 US $)	16.3	13.8	13.9	14.6	16.2	18.9	16.9	16.2	17.2	20.9

a. 98/
b. Data for 1950-54 are from source 99/; for 1955-59, from source 100/.
c. 101/

Table 17

Derivation and Deflation of US Capital Investment in the "Other" Sector of the Economy a/
1950-59

Sector of the Economy	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Total "Other" b/ (billion current US $)	12.2	13.2	13.4	14.5	15.7	18.4	19.4	19.5	18.9	21.4
Equipment c/ (billion current US $)	5.8	5.0	4.9	5.7	5.3	7.1	7.6	7.6	7.4	8.3
Construction d/ (billion current US $)	6.4	8.2	8.5	8.8	10.4	11.3	11.8	11.9	11.5	13.1
Deflator for producer durable equipment e/ (1955 = 100)	86.7	94.3	95.0	96.5	97.5	100.0	106.2	112.9	116.0	118.5
Deflator for nonresidential construction f/ (1955 = 100)	82.5	90.2	93.5	95.8	96.9	100.0	107.3	111.7	112.8	116.1
Equipment (billion 1955 US $)	6.7	5.3	5.2	5.9	5.4	7.1	7.2	6.7	6.4	7.0
Construction (billion 1955 US $)	7.8	9.1	9.1	9.2	10.7	11.3	11.0	10.7	10.2	11.3
Total "Other" (billion 1955 US $)	14.5	14.4	14.3	15.1	16.1	18.4	18.2	17.4	16.6	18.3

a. The category "Other" includes trade, urban services, science, culture, education, health, and fixed military facilities. It has been derived residually (see footnote b, below), and hence it also contains an error element. Because the total figures for construction and private producer durable equipment include an amount for producer durable equipment procured on current expense account (1.0 billion dollars in 1952 -- 102/) and because the Business Plant and Equipment series used in the derivation of the industrial investment series do not include such procurement, some equipment procured for other sectors of the economy must be erroneously classified in "Other" investment.
b. The annual totals were derived as the sum of private new construction and acquisition of producer durable equipment 103/ plus total new public construction 104/ less the sector totals previously derived for industry, agriculture, transport and communications, and housing.
c. Estimated as 39 percent of the total for "Other" on the basis of sales of office and store machines, service industry and household machines, miscellaneous equipment, and passenger cars allocated to business during 1950-54. 105/
d. Derived as a residue by subtracting equipment from total.
e. 106/
f. 107/

APPENDIX C

METHODOLOGY FOR DERIVATION OF SECTORAL RUBLE-DOLLAR RATIOS

For determining the appropriate dollar and ruble valuations of capital investment in the various sectors (industry, agriculture, transport and communications, housing, and "Other"), ruble-dollar ratios for 1955 are needed for the various types of construction and of producer durable equipment. For producer durable equipment a RAND study 108/ is the basic source for individual ruble-dollar ratios, and additional research has been performed to derive class or commodity group ratios as weighted averages using Soviet and US production weights respectively.

For construction, where the differences in results obtained from using available Soviet or US weights are relatively slight, a single set of ratios based on a worksheet comparison of Soviet and US costs was used for both the dollar and ruble valuations. These ruble-dollar ratios were as follows: housing, 7.0 to 1; industrial, 6.2 to 1; highways, 6.5 to 1; and railroads, 9.0 to 1.

For producer durable equipment, the results vary significantly according to the weights used, US or Soviet. In pricing the Soviet mix, in dollars, the following sectoral dollar-ruble ratios were used: total, 0.33 to 1; industry, 0.35 to 1; agriculture, 0.22 to 1; transport and communications, 0.25 to 1; and "Other," 0.33 to 1. In pricing the US mix in rubles, the following ruble-dollar ratios were used: total, 6 to 1; industry, 4 to 1; agriculture, 7 to 1; transport and communications, 4.5 to 1; and "Other," which was strongly influenced by procurement of passenger cars on business account, 10 to 1.

The sectoral ratios for producer durable equipment were derived primarily from inspection of the individual and commodity group ratios arrayed according to ratio.

An outline of the procedure used in deriving the sectoral ratios for pricing the Soviet mix of producer durable equipment in dollars is given as follows. The agricultural dollar-ruble ratio of 0.22 to 1 was derived with consideration of the following group ratios: tractors, 0.20 to 1, and agricultural machinery excluding tractors, 0.23 to 1. The transport and communications ratio of 0.25 to 1 was derived with consideration of the following ratios: trucks and buses, 0.23 to 1, and railroad equipment, 0.27 to 1. For industry generally a ratio of 0.35 to 1 was selected because the mode of the industrial items fell within the range of 0.30 - 0.40 to 1. The ratio for the total mix of producer durable equipment, with Soviet weights, was 0.33 to 1.

The sectoral ratios for pricing the US mix of producer durable equipment in rubles were derived as follows. The agricultural ruble-dollar ratio of 7 to 1 was derived with consideration of the ratio for tractors (11 to 1), and the ratio for agricultural machinery excluding tractors (5 to 1), giving predominant weight to the latter in agricultural investment. The ratio for transport and communications equipment of 4.5 to 1 was derived with consideration of the following ratios: telephone and telegraph equipment, 2.5 to 1; trucks and buses, 4.6 to 1; and railroad equipment, 4.8 to 1. Ratios for industrial producer durable equipment clustered in the range of 3 - 5 to 1, with the ratio of 4 to 1 being selected as most representative. As already stated, for "Other" investment the acquisition of passenger cars strongly influences the equipment ratio; the ratio for passenger cars is 12 to 1, and a ratio of 10 to 1 was selected for the sector.

APPENDIX D

SOURCE REFERENCES

1. US Congress, Congressional Joint Economic Committee, Subcommittee on Economic Statistics (86th Congress, 1st Session). Hearings, Comparisons of the US and Soviet Economies, Washington, 1960, p. 6, 9.
2. Hardt, John P., and Stolzenbach, C. Darwin. The Cold War Economic Gap -- a Threat of Inferiority of US Power, ORO (Johns Hopkins) Technical Paper TP-3, Jul 60, p. 52.
3. Ioffe, Ya. "Uroven' proizvoditel'nosti truda v SSSR i v SShA" (The Level of Productivity of Labor in the USSR and the US), Planovoye khozyaystvo, no 3, Mar 60, p. 54.
4. President of the US. Economic Report of the President Transmitted to Congress, Jan 60, p. 192. (hereafter referred to as Economic Report of the President, 1960)
5. Department of Commerce, Office of Business Economics. National Income, 1954 ed, p. 128. (hereafter referred to as National Income, 1954)
   USSR, Central Statistical Administration. Slovar'-spravochnik po sotsial'no-ekonomicheskoy statistiki (Dictionary and Handbook on Social-Economic Statistics), Moscow, 1948, p. 357.
6. National Income, 1954 (5, above), p. 43.
   USSR, Scientific Research Institute of Finance. Planirovaniye i finansirovaniye kapital'nogo remonta osnovnykh fondov (Planning and Financing of Capital Repair of Fixed Assets), Moscow, 1958, p. 12-13.
7. Department of Commerce, Office of Business Economics. US Income and Output, 1958, p. 81. (hereafter referred to as US Income and Output)
8. National Income, 1954 (5, above), p. 130.
9. Ibid., p. 128.
10. Ibid., p. 123.
11. Department of Commerce, Bureau of the Census. 1954 Census of Manufactures, vol II, "Industry Statistics," pt 1, p. xx.
12. Mikhaylov, P.D. Dogovory i raschety kapital'nom stroitel'stve (Contracts and Estimates in Capital Construction), Moscow, 1957, p. 83 ff.
    Kvasha, Ya., and Krasovskiy, V. "Tempy vosproizvodstva i struktura kapitalovlozheniy (Rates of Reproduction and Structure of Capital Investments), Voprosy ekonomiki, no 6, Jun 60, p. 29 ff.

13. Vishnevskiy, A., Zenovich, V., and Makeyev, Yu. "Razvitiye basy stroitel'stva v Orenburgskom rayone" (The Development of the Construction Base in Orenburg Rayon), Ekonomika stroitel'stva, no 5, May 60, p. 11.
14. Kvasha and Krasovskiy (12, above), p. 33.
15. Ibid., p. 29 ff.
16. Department of Commerce, Bureau of the Census. Annual Survey of Manufactures, 1956, Washington, 1958, p. 219.
US Income and Output (7, above), p. 192.
17. USSR, Central Statistical Administration. Narodnoye khozyaystvo SSSR v 1958 godu (The National Economy of the USSR in 1958), Moscow, 1959, p. 620. (hereafter referred to as Narodnoye khozyaystvo 1958)
18. Department of Commerce, Bureau of the Census. Annual Survey of Manufactures, 1956, Washington, 1958, p. 219.
19. Economic Report of the President, 1960 (4, above), p. 160.
20. Narodnoye khozyaystvo 1958 (17, above), p. 620.
21. USSR, Central Statistical Administration. SSSR v tsifrakh v 1959 godu (The USSR in Figures for 1959), Moscow, 1960, p. 181. (hereafter referred to as Tsifrakh 1959)
22. Narodnoye khozyaystvo 1958 (17, above), p. 619.
23. Tsifrakh 1959 (21, above), p. 180-181.
24. Golev, Ya. "Razvitiya dolgosrochnogo sel'skokhozyaystvennogo kredita SSSR" (The Development of Long-Term Agricultural Credit in the USSR), Finansy, no 2, Feb 56, p. 54 ff.
25. Nosyrev, S. "Dolgosrochnyy kredit i ego znacheniye v sozdanii osnovnykh fondov kolkhozov" (Long-Term Credit and Its Significance in the Establishment of Fixed Assets of Kolkhozes), Uchet i finansy v kolkhozakh i sovkhozakh, no 3, Mar 58, p. 33.
26. Rumyantseva, A.V. Obshchestvennyye fondy kolkhozov (Social Funds of Kolkhozes), Znaniye, ser III, no 9, 1960, p. 19.
27. Ibid.
28. Finansy, Feb 59, p. 10 ff.
29. USSR, Supreme Soviet of the USSR. Zasedaniya verkhovnogo soveta SSSR, chetvertogo sozyva, devyataya sessiya, stenograficheskiy otchet (Proceedings of the Supreme Soviet of the USSR, 4th Meeting, 9th Session: Stenographic Report), Moscow, 1958, p. 50.
30. Kolessev, S., edr. Pobedy sotsialisticheskogo sel'skogo khozyaystva SSSR (Victories of Socialist Agriculture in the USSR), Moscow, 1958, p. 340.
Pavlov, P. Snashivaniye i amortizatsiya osnovnykh fondov (Depreciation and Amortization of Fixed Assets), Moscow, 1957.
31. Levin, B.I., and Soldatov, Ye. G. V pomoshch' izuchayushchim transportnogo stroitel'stva (Aid for Students of Transport Construction), Moscow, 1959, p. 50.

32. Plotnikov, K.N. Ocherki istorii byudzheta sovetskogo gosudarstva (Outlines of the History of the Soviet State Budget), Moscow, 1954, p. 509.
33. USSR. Raskhody na sotsial'no-kul'turnyye meropriyatiya po gosudarstvennomu byudzhetu SSSR, statisticheskiy sbornik (Expenses for Social-Cultural Measures in the State Budget of the USSR, a Statistical Yearbook), Moscow, 1958, p. 46, 71.
34. Rabinovich, N., edr. Politicheskaya ekonomiya, uchebnik (Political Economy, a Textbook), 3d ed, 1958, p. 487.
35. Narodnoye khozyaystvo 1958 (17, above), p. 180-181.
36. USSR, Central Statistical Administration. Narodnoye khozyaystvo SSSR v 1959 godu (The National Economy of the USSR in 1959), Moscow, 1960, p. 543. (hereafter referred to as Narodnoye khozyaystvo 1959)
37. Pravda, 23 Apr 54.
Ibid., 27 Jan 55.
Ibid., 30 Jan 56.
Izvestiya, 4 Feb 55.
Trud, 1 Sep 55.
Stroitel'naya gazeta, 1 Apr 56.
38. Narodnoye khozyaystvo 1958 (17, above), p. 622-623.
39. Ibid.
40. Narodnoye khozyaystvo 1959 (36, above), p. 549.
41. Ibid.
42. Narodnoye khozyaystvo 1958 (17, above), p. 623.
43. Ibid., p. 636.
44. Tsifrakh 1959 (21, above), p. 252.
45. Baranov, N.V., et al., edrs. Trudy II sessii akademii stroitel'stva i arkhitektury SSSR po voprosam zhilishchnogo stroitel'stva (Reports of the Second Session of the Academy of Construction of the USSR on Problems of Housing Construction), Moscow, 1958, p. 54.
46. Perov, G. "Sotsialisticheskoye vosproizvodstvo v period osushchestvleniya semiletnego plana" (Socialist Reproduction in the Period of Fulfillment of the Seven Year Plan), Planovoye khozyaystvo, no 3, Mar 59, p. 22.
Nikolayev, A. "Vsemernoye razvitiye zhilishchnogo stroitel'stva -- vazhneyshaya ovshche-narodnaya zadacha (Intensive Development of Housing Construction -- the Most Important National Task), Planovoye khozyaystvo, no 4, Apr 58, p. 25.
47. Sharov, A. "Zhilishchnoye stroitel'stvo v SSSR" (Housing Construction in the USSR), Planovoye khozyaystvo, no 2, Feb 52, p. 69.
Pravda, 23 Jan 53.
Ibid., 27 Jan 55.
Ibid., 30 Jan 56.
Izvestiya, 1 Feb 54.

48. Pravda, 1 Aug 57.
49. Izvestiya, 28 Jan 58.
50. Pravda, 16 Jan 59, p. 3.
51. USSR. Ob itogakh vypolneniya gosudarstvennogo plana razvitiya narodnogo khozyaystva SSSR v 1959 godu (Results of Fulfillment of the State Plan for Development of the National Economy of the USSR in 1959), 1960, p. 30.
52. Stroitel'naya gazeta, 3 Dec 1958.
53. Narodnoye khozyaystvo 1958 (17, above), p. 622-623.
54. Ibid.
55. Finansy i kredit, no 10, Oct 53, p. 19.
56. USSR, Supreme Soviet of the USSR. Zasedaniya verkhovnogo soveta SSSR, chetvertogo sozyva, chetvertaya sessiya, stenograficheskiy otchet (Proceedings of the Supreme Soviet of the USSR, 4th Meeting, 4th Session: Stenographic Report), Moscow, 1955, p. 12.
57. Narodnoye khozyaystvo 1958 (17, above), p. 622-623.
58. USSR, Supreme Soviet of the USSR. Zasedaniya verkhovnogo soveta SSSR, chetvertogo sozyva, pervaya sessiya, stenograficheskiy otchet (Proceedings of the Supreme Soviet of the USSR, 4th Meeting, 1st Session: Stenographic Report), Moscow, 1954, p. 41.
59. Narodnoye khozyaystvo 1958 (17, above), p. 622-623.
60. Narodnoye khozyaystvo 1959 (36, above), p. 549.
61. Narodnoye khozyaystvo 1958 (17, above), p. 622-623.
62. Ibid., p. 619.
63. Ibid., p. 622-623.
64. USSR, Central Statistical Administration. Sel'skoye khozyaystvo SSSR, statisticheskiy sbornik (Agriculture in the USSR, a Statistical Collection), Moscow, 1960, p. 387.
65. Narodnoye khozyaystvo 1958 (17, above), p. 87, 619.
66. Ibid., p. 622-623.
67. Narodnoye khozyaystvo 1959 (36, above), p. 549.
68. Narodnoye khozyaystvo 1958 (17, above), p. 59.
USSR, Central Statistical Administration. Promyshlennost' SSSR, Moscow, 1957, p. 16.
69. Narodnoye khozyaystvo 1958 (17, above), p. 622-623.
70. Ibid.
71. Ibid.
72. Ibid.
73. Narodnoye khozyaystvo 1959 (36, above), p. 549.
74. Economic Report of the President, 1960 (4, above), p. 160.
75. Ibid.
76. US Income and Output (9, above), p. 193.
77. Survey of Current Business, Dec 59, p. 4.
78. Ibid., Mar 60, p. 16.
79. Economic Report of the President, 1960 (4, above), p. 155, 191.

80. Ibid., p. 155-156.
81. Ibid., p. 165.
82. US Income and Output (7, above), p. 192.
83. Economic Report of the President, 1960 (4, above), p. 165.
84. Ibid., p. 165.
Departments of Labor and Commerce, Construction Volume and Costs, 1915-1956, Washington, 1958, p. 4. (hereafter referred to as Construction Volume and Costs)
85. Economic Report of the President, 1960 (4, above), p. 165.
86. Ibid., p. 192.
87. Ibid., p. 160.
88. US Income and Output (7, above), p. 225, 229.
89. Economic Report of the President, 1960 (4, above), p. 160.
90. Ibid.
91. US Income and Output (7, above), p. 193.
Survey of Current Business, Mar 60, p. 16.
92. US Income and Output (7, above), p. 193.
Survey of Current Business, Mar 60, p. 16.
93. Economic Report of the President, 1960 (4, above), p. 192.
94. US Income and Output (7, above), p. 193.
Survey of Current Business, Mar 60, p. 16.
95. US Income and Output (7, above), p. 190.
Construction Volume and Costs, p. 9, 19.
96. Economic Report of the President, 1960 (4, above), p. 160.
97. Ibid.
98. Ibid., p. 191.
99. Construction Volume and Costs (79, above), p. 6.
100. Construction Review, Mar 60, p. 20.
101. Economic Report of the President, 1960 (4, above), p. 160.
102. National Income, 1954 (5, above), p. 135.
103. Economic Report of the President, 1960 (4, above), p. 155.
104. Ibid., p. 192.
105. US Income and Output (7, above), p. 192.
106. Economic Report of the President, 1960 (4, above), p. 160.
107. Ibid., p. 160.
108. Becker, Abraham S. Prices of Producers' Durables in the United States and the USSR in 1955, RAND Corporation Report RM-2432, 15 Aug 59. U.